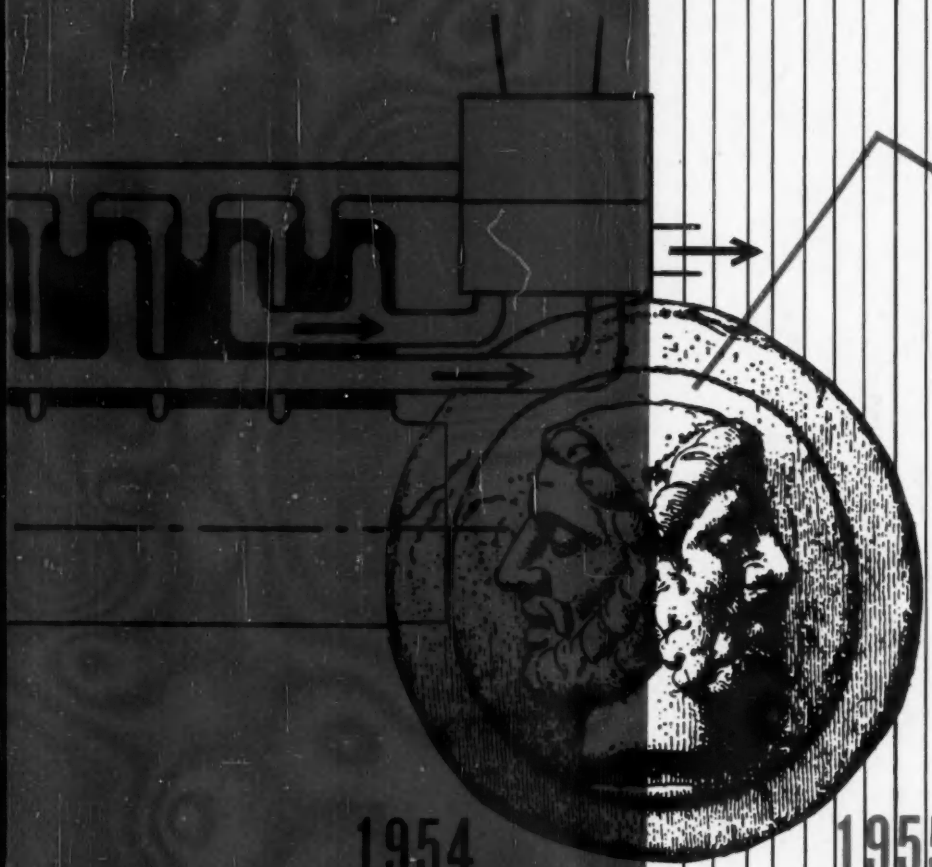
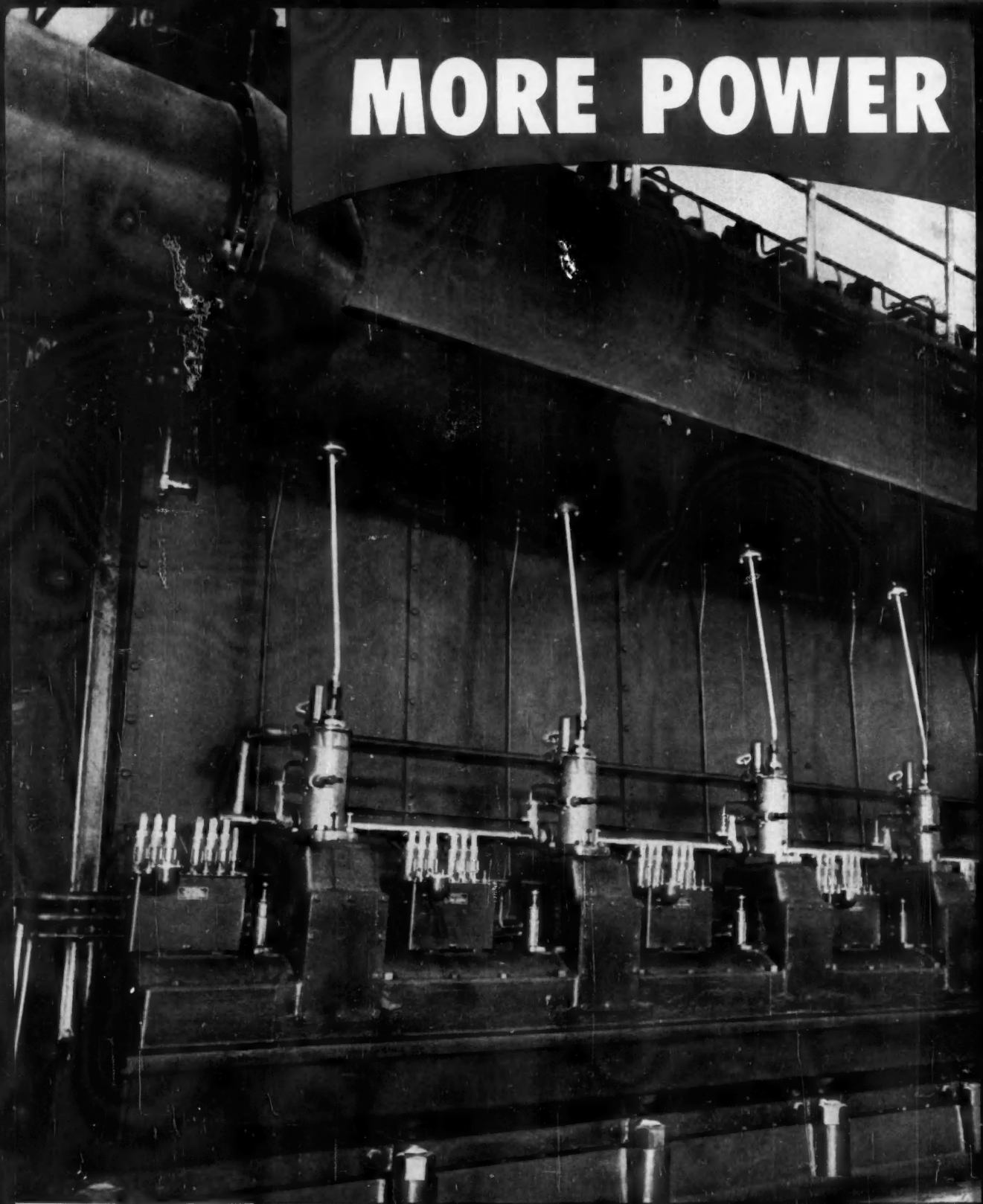
diesel power

JANUARY 1955



1954

1955



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radio broadcasts
Saturday afternoons.

TEXACO
REG. T.M.

TEXACO

...LESS FUEL...OVER LONGER PERIODS

YOUR BEST assurance of low fuel consumption—and low maintenance costs, too—is to use effective lubrication: one of the famous *Texaco Ursa Oil* series, a complete line of diesel lubricating oils especially refined to make engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

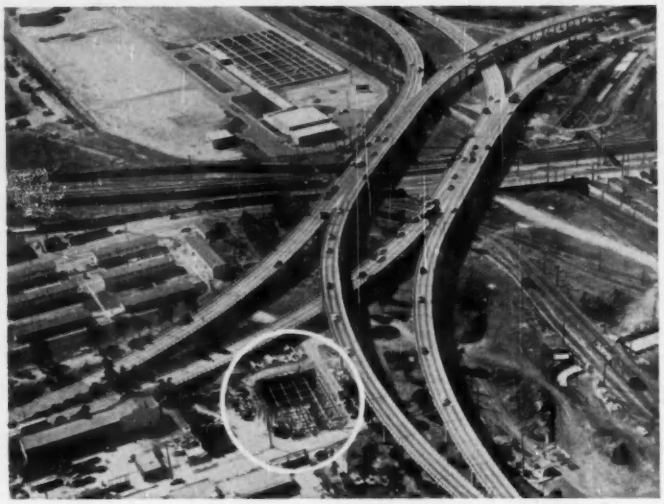
Use the recommended *Texaco Ursa Oil* and enjoy clean operation... freedom from harmful deposits... rings always free for proper compression and combustion... longer life for parts. These are the benefits that explain why—

For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.

Let a Texaco Lubrication Engineer give you the full story on how *Texaco Ursa Oils* can help you reduce your diesel operating costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

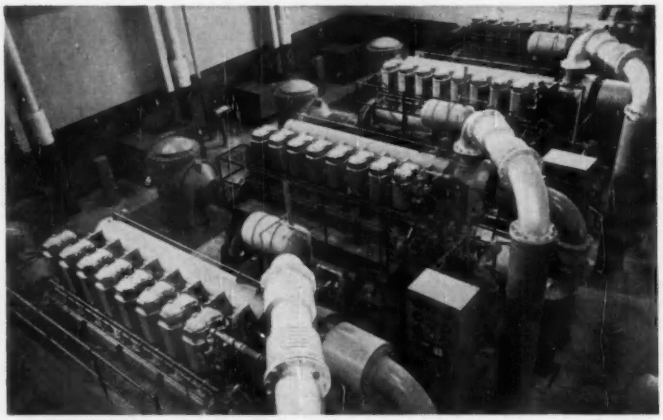
URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



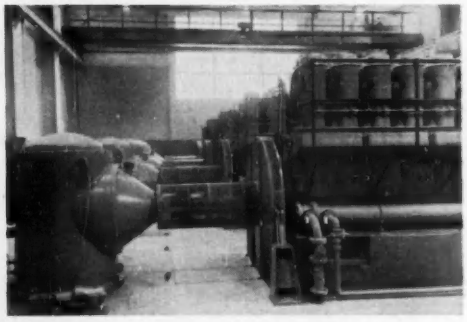
The Oakland storm water pumping station is equipped with four Enterprise Turbocharged Diesels driving huge mixed-flow pumps. Drainage conduits are large enough to drive an auto through.

Early construction stage of new pumping station, heart of the East Bay city's lowland drainage and flood control project.

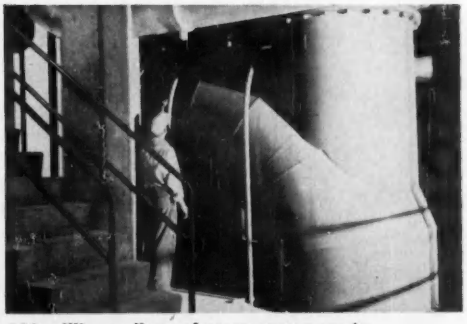
Let it pour! Oakland licks storm flood problem with new diesel pumping plant



The four 1200 BHP Enterprise DSG-318 Engines are completely automatic, require no attendant. Rising water level starts engines, regulates speeds for proper pumping capacity.



Eight-cylinder engines drive giant axial flow pumps though flexible couplings and right angle gears.



650 million gallons of storm water can be pumped through this Enterprise equipped station in 24 hours—a full railroad tank car every second!

Will your city be faced with flooded streets and costly water damage this year? Your flood problem can be prevented by calling in qualified Enterprise engineers now to assist you in planning adequate, independently powered flood control facilities. No matter what pumping capacities you require, there's an Enterprise Engine designed to do the job more efficiently and at lower cost.

Enterprise Engines for every municipal need. Whether it's for flood or water supply pumping systems, stationary or portable electric generating plants, or for sewage disposal, you'll find there's an Enterprise Engine ideally suited for most dependable service. Contact the Enterprise Engine sales office in your area, or write us direct about your problem.

Over a million horsepower at work the world over!

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diesel power

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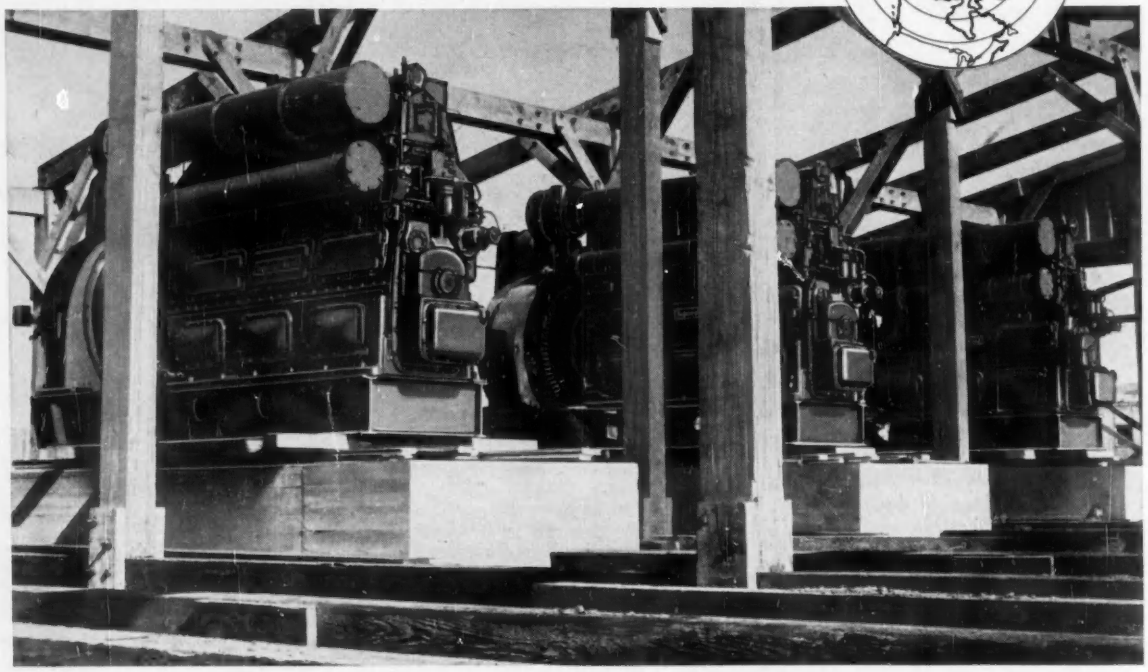
This Month's Cover

Janus, the Roman deity who faces two ways, symbolizes the nature of this issue—looking ahead to the future and backward to review some of last year's developments.

At civilization's northernmost outpost . . .



where trouble-free performance is a must!

At Thule, Greenland, is the site of a U. S. Air Force Base only 900 miles from the North Pole where winter is eight months long and temperatures as low as 50° below zero, with hurricane winds reaching a velocity of up to 150 miles an hour.

Here in this Arctic outpost, 30 Ingersoll-Rand Diesel engines with Bendix* Fuel Injection Equipment are used to generate all the necessary electric power.

Obviously it would be difficult to pick a more vigorous proving ground for year-'round efficient performance for these Bendix-equipped Ingersoll-Rand Diesels.

Here indeed, is another striking example that when the going is toughest Bendix Fuel Injection Equipment is the logical choice for any diesel manufacturer. *REG. U.S. PAT. OFF.

BENDIX Fuel Injection Equipment

THE NAME Bendix AVIATION CORPORATION MILLIONS TRUST

SCINTILLA DIVISION
Sidney, New York

Export Sales:
Bendix International Division
205 East 42nd Street
New York 17, N. Y.

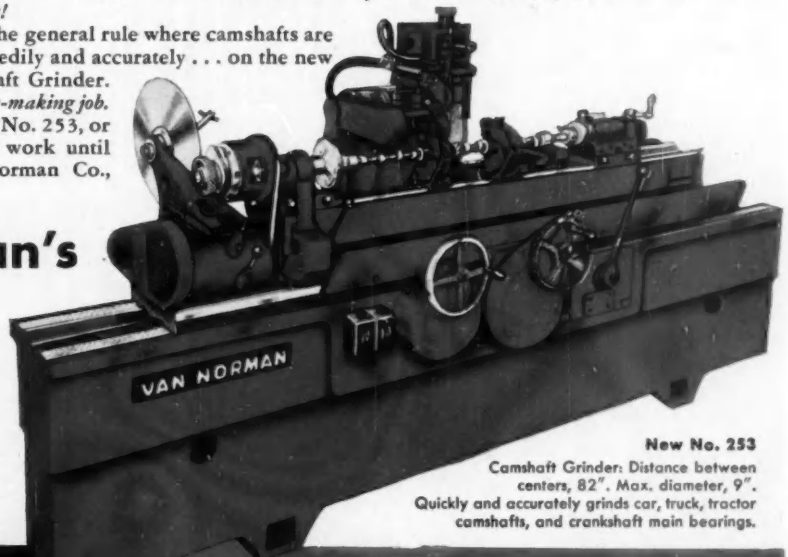
Q. What keeps all eyes on Bus No. 54?

No. 54 had been a poor performer on the 100-mile route operated by Peter Pan Bus Lines between Boston and Springfield, Mass. So when it went in for overhaul at 500,000 miles, the maintenance superintendent decided to have the camshaft reground on a Van Norman No. 253. Watching the operation, he could hardly believe that the shaft was out as much as it showed.

Then the reground shaft was re-installed...and ever since old No. 54 has been the king of the highway, the hottest bus on the route . . . the center of interest and envy of every driver on the line. And it's the special pride of Peter Pan's maintenance superintendent . . . for since the camshaft job was done, *No. 54 has added another 100,000 smooth, economical miles!*

Success stories like this are the general rule where camshafts are "put back in business" . . . speedily and accurately . . . on the new Van Norman No. 253 Camshaft Grinder. *And every camshaft job is a money-making job.* So see your jobber now about a No. 253, or have him do your customers' work until you're ready to buy. Van Norman Co., Springfield 7, Mass.

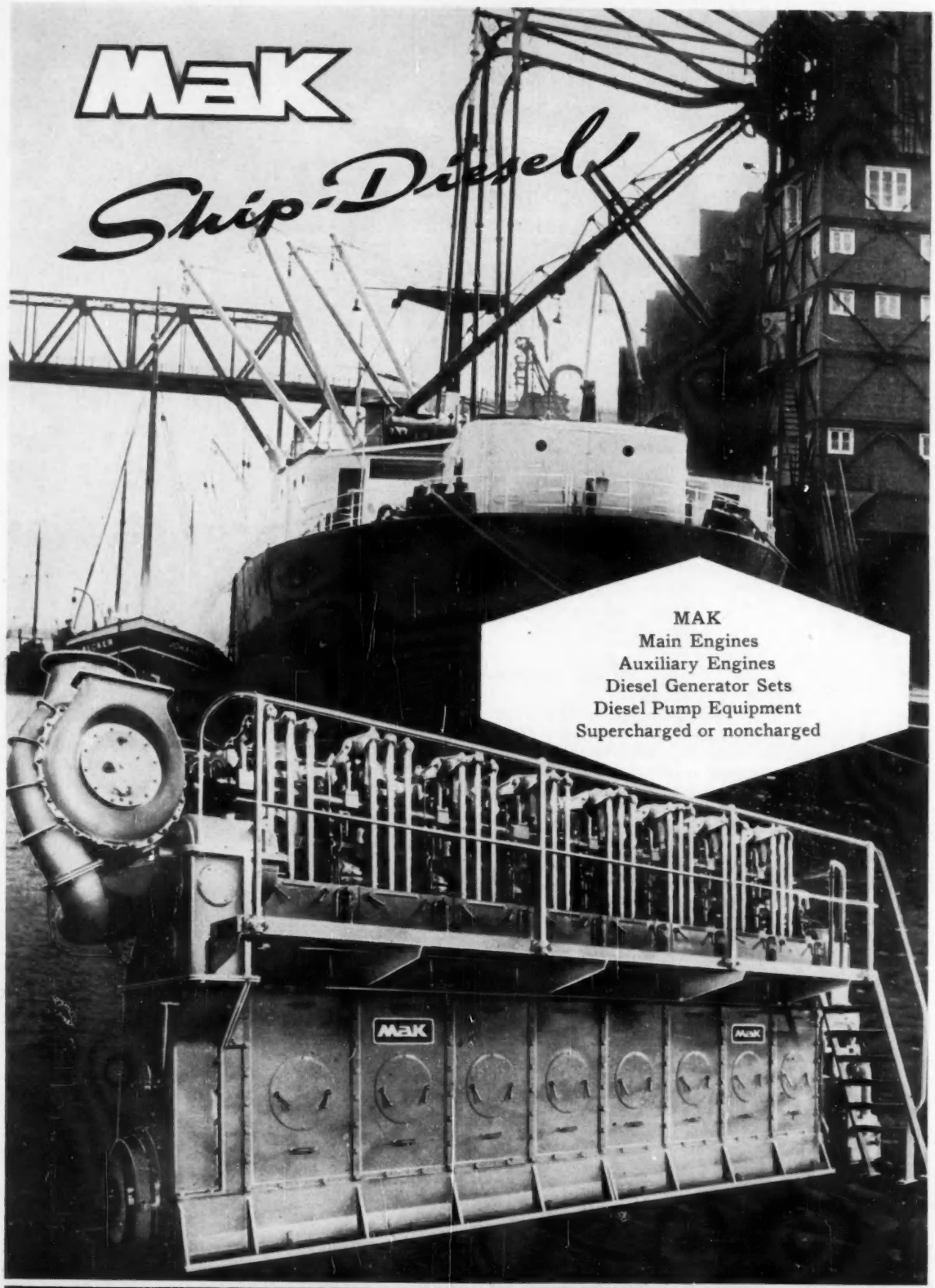
A. Van Norman's No. 253 Camshaft Grinder!



New No. 253
Camshaft Grinder: Distance between centers, 82". Max. diameter, 9". Quickly and accurately grinds car, truck, tractor camshafts, and crankshaft main bearings.

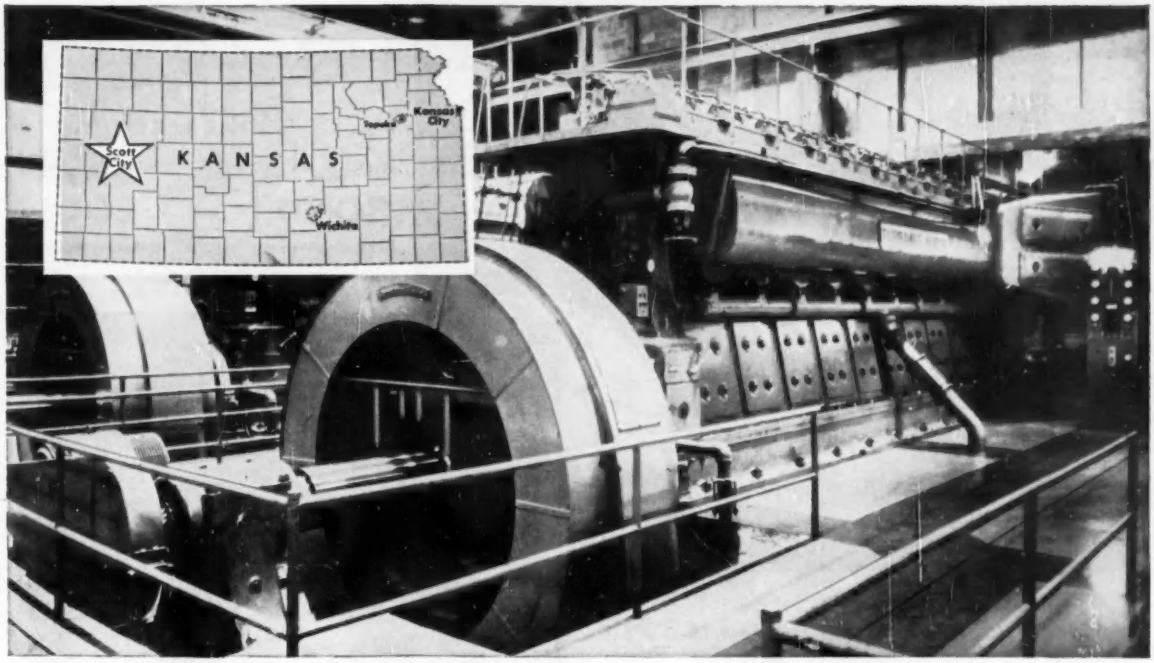
The Best-Equipped Shop Gets the Business!

that's why *"It Pays to Van Normanize"*



MASCHINENBAU KIEL AKTIENGESELLSCHAFT

GERMANY

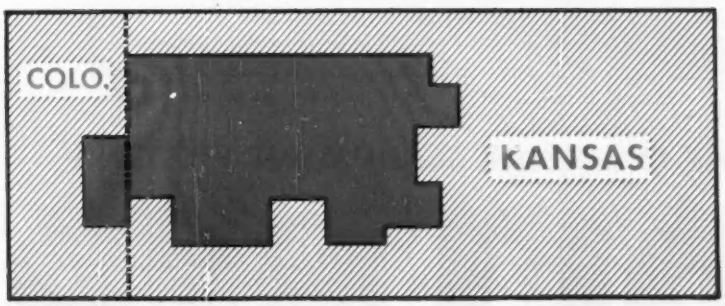


Largest REA Plant in Kansas Reports Cities Service DC-840 Diesel Oil Excellent!

Fairbanks-Morse Diesels of Wheatland Electric Cooperative, Inc. give outstanding performance using DC-840 Oil for power cylinder and crankcase lubrication. Here are the results Wheatland achieved:

1. House operation each unit—13,000 hours.
2. No oil changes due to oil failure.
3. No overhaul or major breakdown.
4. Rings free in groove with little or no signs of wear.
5. Oil consumption within mfgr's. recommendation.
6. Fuel consumption 10,572 BTU/KWH, load factor 63.7%.
7. Maintenance of lubricating oil at minimum expense.
8. 3500 H.P. hours per gallon of lubricating oil.
9. No wear on main or rod bearings.
10. No oil change at end of 9,000 hours.

For similar results in your Diesel operation, contact your nearest Cities Service office or write to Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.



WHEATLAND ELECTRIC COOPERATIVE, INC. serves 3,300 square miles in all or part of Scott, Wichita, Hamilton, Greeley, Kearny, Wallace, Logan and Finney Counties in Kansas as well as sections of Kiowa and Prowers Counties in neighboring Colorado. Also supplies wholesale the Lane-Scott Cooperative serving 2,200 square miles in 6 Kansas Counties.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

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STOPS! RING GROOVE WEAR

Double Bonded

METALLURGICALLY Al-Fin Bond

MECHANICALLY Zollner Lock

ZOLLNER

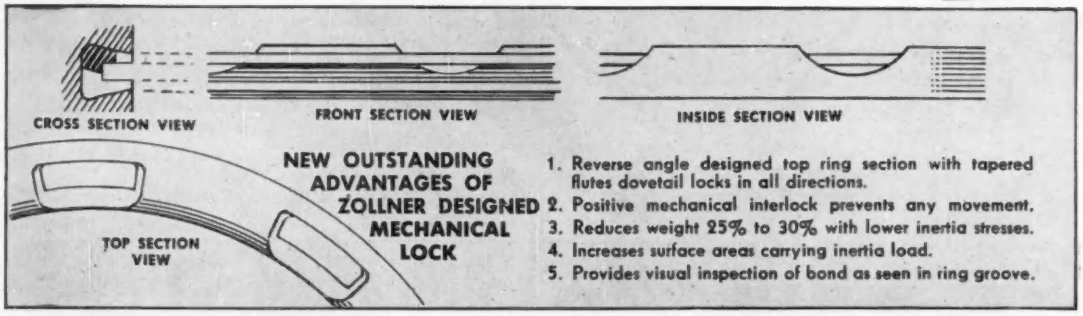
"Ni-Resist" Iron Top Ring Section

BOND LOC*

For Extra Heavy Duty Service

PISTONS

Up to 5 times more mileage is typical of this great new piston development by Zollner engineers. Designed for the most severe service, the BOND-O-LOC Piston has a "Ni-resist" iron top ring groove section *permanently* incorporated by *both* Al-Fin metallurgic bond and the exclusive Zollner mechanical lock. Separation failure is impossible. Reverse angles on every surface joining the "Ni-resist" iron section provide a multiple dovetail bond which is infinitely wedge-locked. Ring groove wear problems are eliminated, blow-by prevented, oil consumption reduced, mileage between overhauls greatly increased. Many heavy duty engine builders have already tested and approved BOND-O-LOC advantages. Request complete information, now.



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1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879 * T. M. Reg. Pat. App. For

- ADVANCED ENGINEERING
- PRECISION PRODUCTION

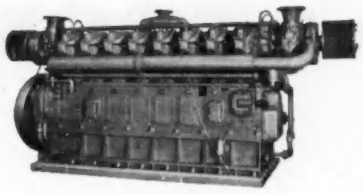
in cooperation with engine builders

ZOLLNER PISTONS

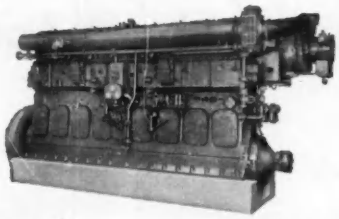
THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

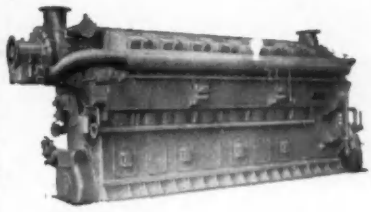
ZOLLNER MACHINE WORKS • Fort Wayne, Indiana



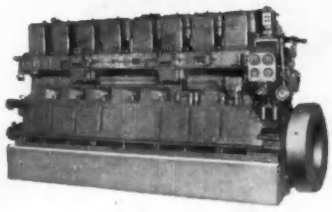
TYPE FVA.....8, 12 or 16 cyl.
Diesel — Atmospheric ..... 430 to 1150 hp.
Diesel — Supercharged .....1110 to 2230 hp.



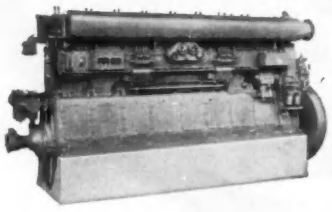
TYPE LS.....6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas .....720 to 2500 hp.
Diesel .....825 to 2500 hp.
Gas-Diesel .....825 to 2500 hp.



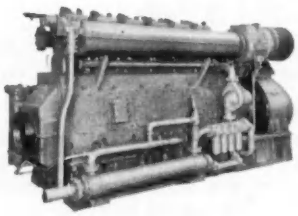
TYPE LSV .....12 or 16 cyl.
Atmospheric and Supercharged
Gas .....1440 to 5000 hp.
Diesel .....1650 to 5000 hp.
Gas-Diesel .....1650 to 5000 hp.



TYPE 15 .....5, 6, 7 or 8 cyl.
Atmospheric and Supercharged
Gas .....375 to 1815 hp.
Diesel .....450 to 1815 hp.
Gas-Diesel .....430 to 1815 hp.



TYPE GS .....5, 6 or 8 cyl.
Atmospheric and Supercharged
Gas .....320 to 1460 hp.
Diesel .....300 to 1460 hp.
Gas-Diesel .....300 to 1460 hp.



TYPE FW .....6 cyl.
Diesel — Atmospheric .....245 to 500 hp.
Diesel — Supercharged .....350 to 835 hp.

it pays to meet power and compressor needs "right on the nose" . . with COOPER-BESSEMERS

• Think a moment about the importance of meeting engine or compressor needs with machines that are exactly *right* for the job. With Cooper-Bessemers you have this assurance, as evidenced by the broad range of units shown here — all standard, proved Cooper-Bessemers, engineered to give *maximum* return in any kind of service you can name, from 300 to 5,000 bhp. Note, too, the flexibility offered by each basic engine type — in number of cylinders, aspiration, horsepower range and fueling.

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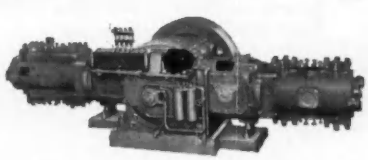
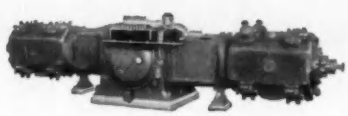
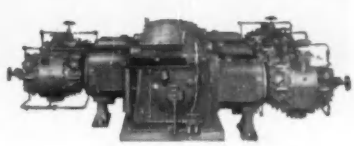


TYPE EM
To 350 hp.
9" stroke
Speed to 514 RPM

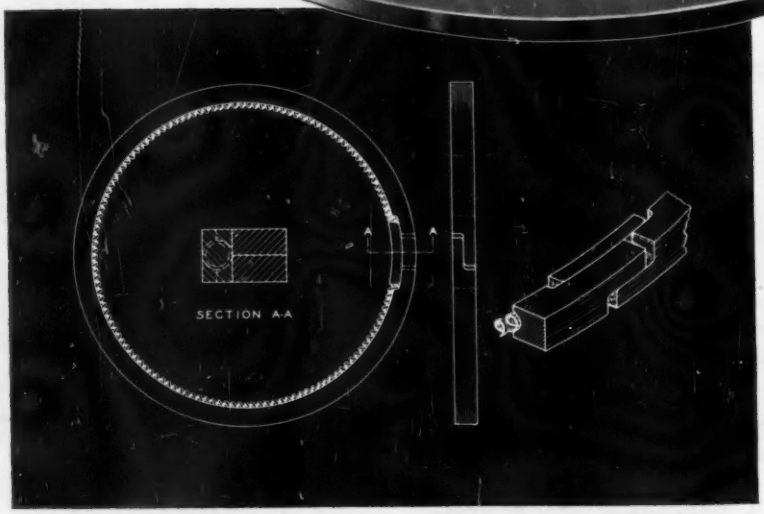


TYPE FM
To 1500 hp.
10½" stroke
Speed to 514 RPM



TYPE JM
500 to 3000 hp.
14" stroke
Speed to 327 RPM

Look to COOK



1. Complete flexibility assures perfect wall contact at all times. No wear in period required.
2. Sealing function is double acting which makes ring ideal for all services and simplifies installation.
3. Step-cut construction seals joint contact with cylinder. Special overlapping gib seals joint at groove sides. Seal complete at all points.
4. May be fabricated from any material, including bakelite.
5. Spring actuation independent of groove bottom which assures uniform distribution of tension.

for Better Rings!

COOKTITE 301-1X COMPRESSION RING— the Perfect Seal, in Sizes 6 to 60"!

Ideal for any Service—Available in any Material!

FROM the minute it's installed and throughout its long life, the new Cooktite 301-1X compression ring fits tight around the cylinder — and every inch of the stroke — even in worn or out-of-round cylinders. The secret is in its design — uniform tension and perfect flexibility are provided by the spring member which is independent of the groove bottom. Step-cut construction seals the cylinder contact completely, and prevents blowby. A separate overlapping gib seals the inner joints at both sides of the groove, and all parts have free toggle action to prevent key locking and breakage.

The Cooktite 301-1X is available in sizes from 6" to 60" in any material to suit the service intended. For larger sizes, grooves may be reduced to cut down both ring and piston weight, thus reducing inertia forces and the effect of G values.

The Cooktite 301-1X is extremely easy to install and is ideal for all types of service — compressors, internal combustion engines, liquid pumps, pneumatic clutches, chucks, valves, etc. Mail the coupon today for additional engineering data on your particular problem.

C. LEE COOK COMPANY

Sealing Pressures Since 1888

C. Lee Cook Company
932 South 8th Street
Louisville 3, Kentucky

Gentlemen: Please send me complete engineering data on the Cooktite 301-1X compression ring.

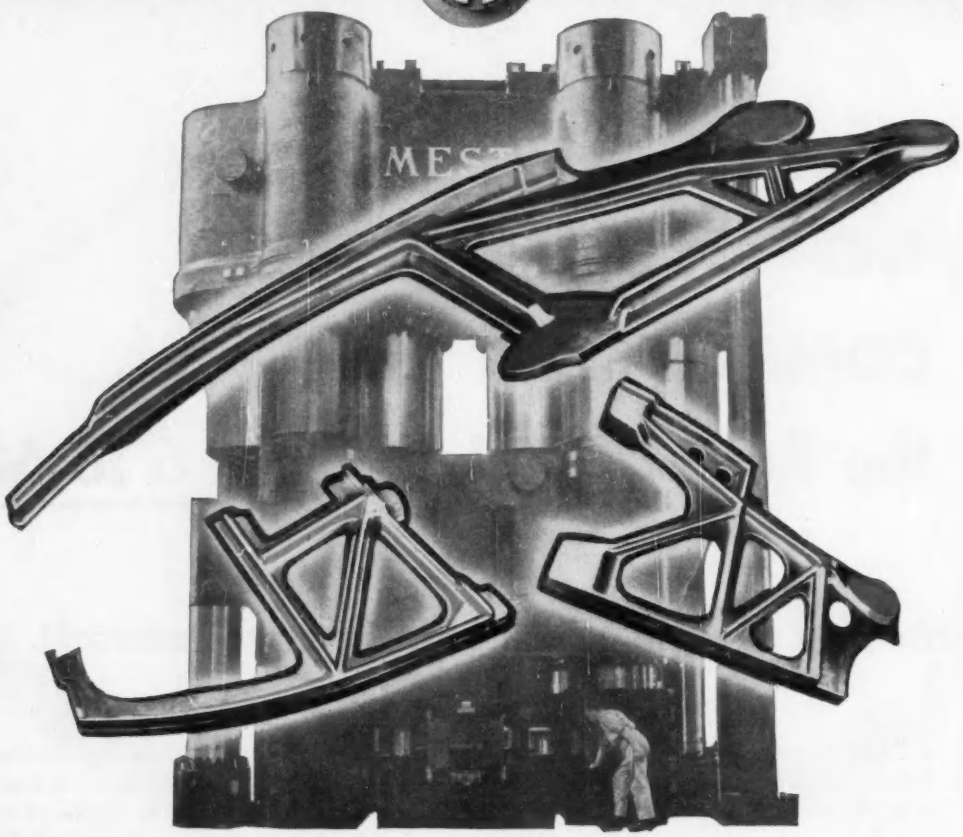
Firm_____

Street_____

City_____ State_____

Attention:_____

Type of Units_____



Greater Size and Speed in Aircraft have created engineering problems, the solution of which has required larger and larger forgings of high-strength aluminum alloy. *Examples* shown above are forged structural members used in a modern military bomber, the largest more than seven feet over all. These are forged on an 18,000 ton press, the biggest ever built in this country.

Wyman-Gordon Experience—the most extensive in the industry—is keeping abreast of new forging demands involving the use of Steel, Aluminum, Magnesium, High Density Alloys and Titanium.

• • •

Standard of the Industry for More than Seventy Years

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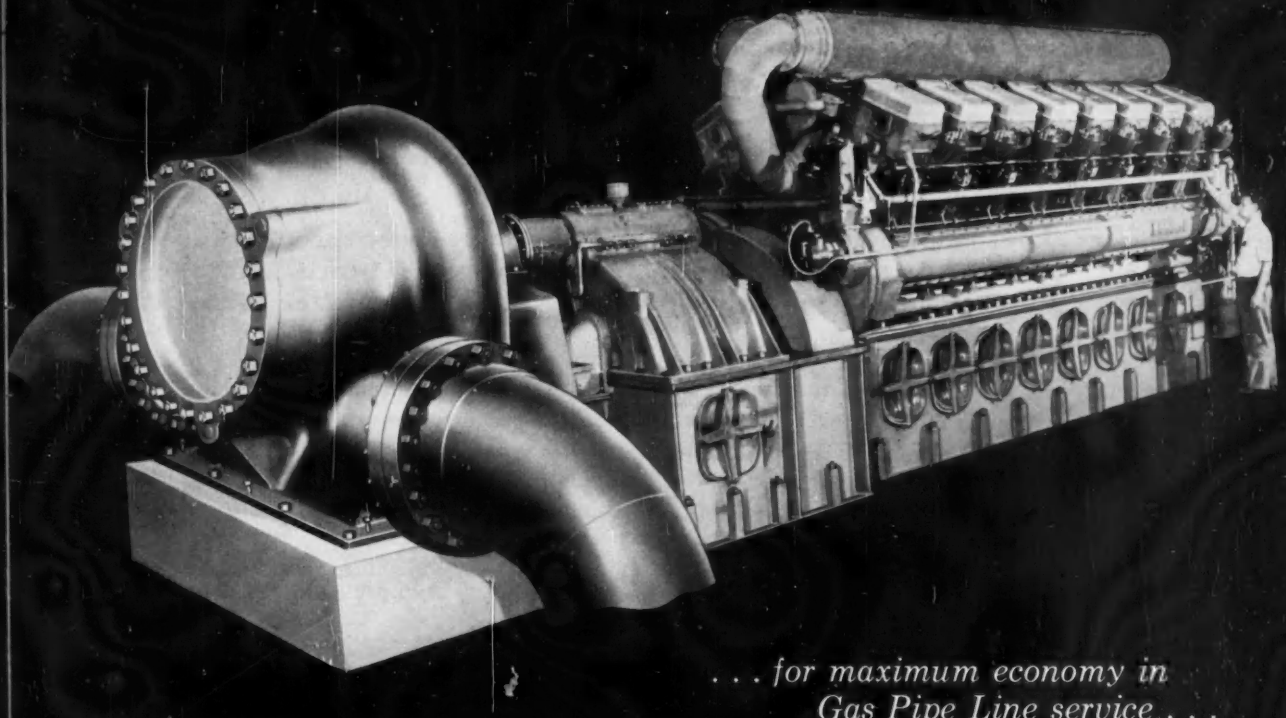
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN



. . . for maximum economy in Gas Pipe Line service . . .

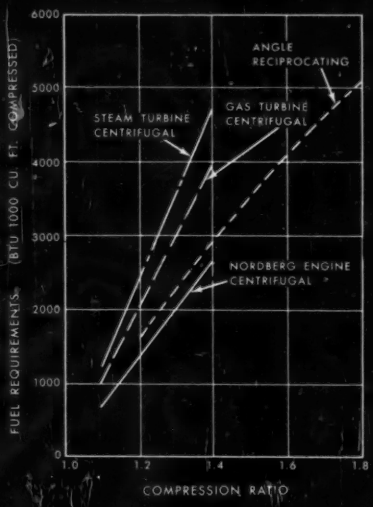
THE NORDBERG *SUPAIRTHERMAL*®

ENGINE-DRIVEN CENTRIFUGAL COMPRESSOR UNIT

Here is the latest development in compact, dependable power for maximum efficiency and economy in gas pipe line transmission service . . . *The Nordberg Supairthermal Engine-Driven Centrifugal Compressor Unit.*

Through use of exclusive design principles, the Nordberg *Supairthermal* spark-ignition gas engine operates at better than 40% thermal efficiency — with correspondingly lower fuel cost, increased horsepower, lower lube oil consumption, and lower maintenance costs per horsepower hour. The *Supairthermal* engine drives the compressor through a close-coupled speed increasing gear mounted on the bedplate extension of the engine.

Here, then, is an extremely compact, efficient engine-driven compressor unit which can be installed at low capital investment and operated at lower cost per horsepower than any other type of gas pipe line prime mover.



Savings of thousands of dollars per day in fuel costs on large gas pipe lines can be realized with the Nordberg engine-driven centrifugal gas compressor unit because this unit requires less fuel to compress gas than any other modern type of equipment of comparable capacity.

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faster, smoother

The watchwords of today's American railroads—faster, smoother travel—are typical of the Pennsylvania Railroad's stream-liner, the Spirit of St. Louis, which makes the trip between St. Louis and New York an enjoyable experience for the traveler.

Gulf Dieselmotive Oil contributes to the fine performance of the giant Diesel engines that power the Spirit of St. Louis and many other crack trains. Here's how this top quality Diesel locomotive lubricant helps keep maintenance costs down, availability up:

1 Effective detergent action prevents harmful piston ring belt deposits.

2 Base stocks are selected for their ability to help prevent hard deposits on the piston crown and in the ring belt area.

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Gulf Sales Engineers, experienced in railroad Diesel operation, are always available to aid you in maintaining high standards of lubrication throughout your system. Write, wire, or phone your nearest Gulf office today, and have a Gulf Sales Engineer call.

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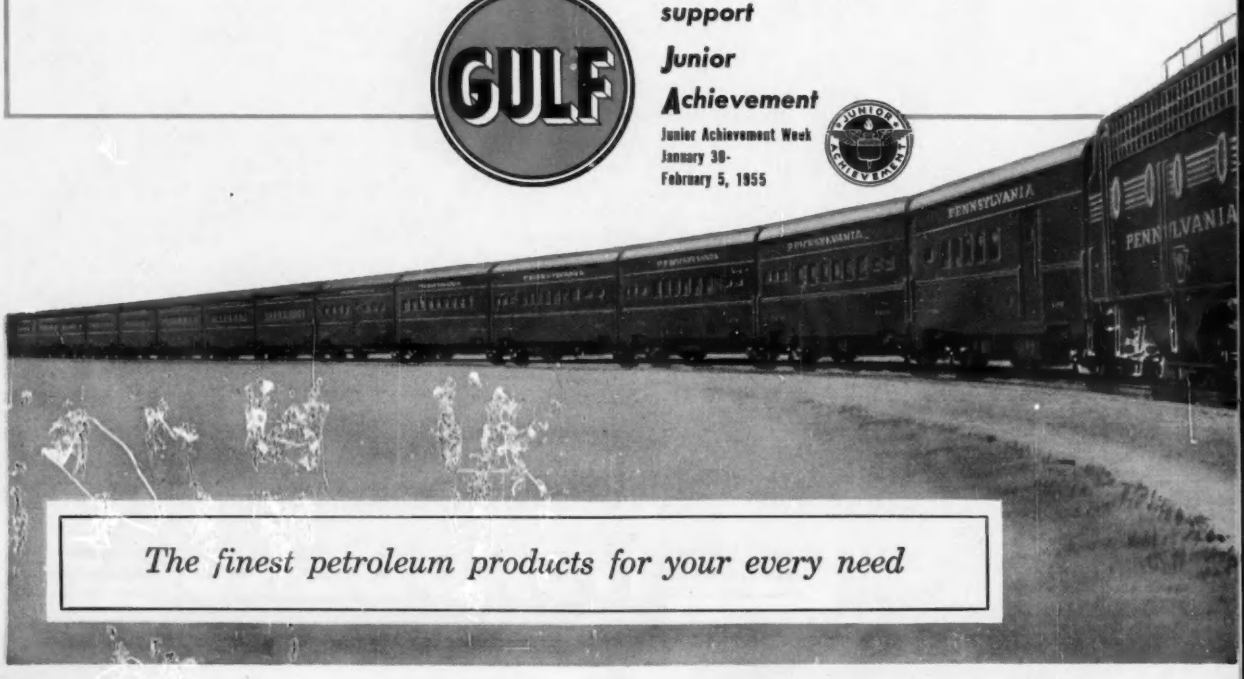

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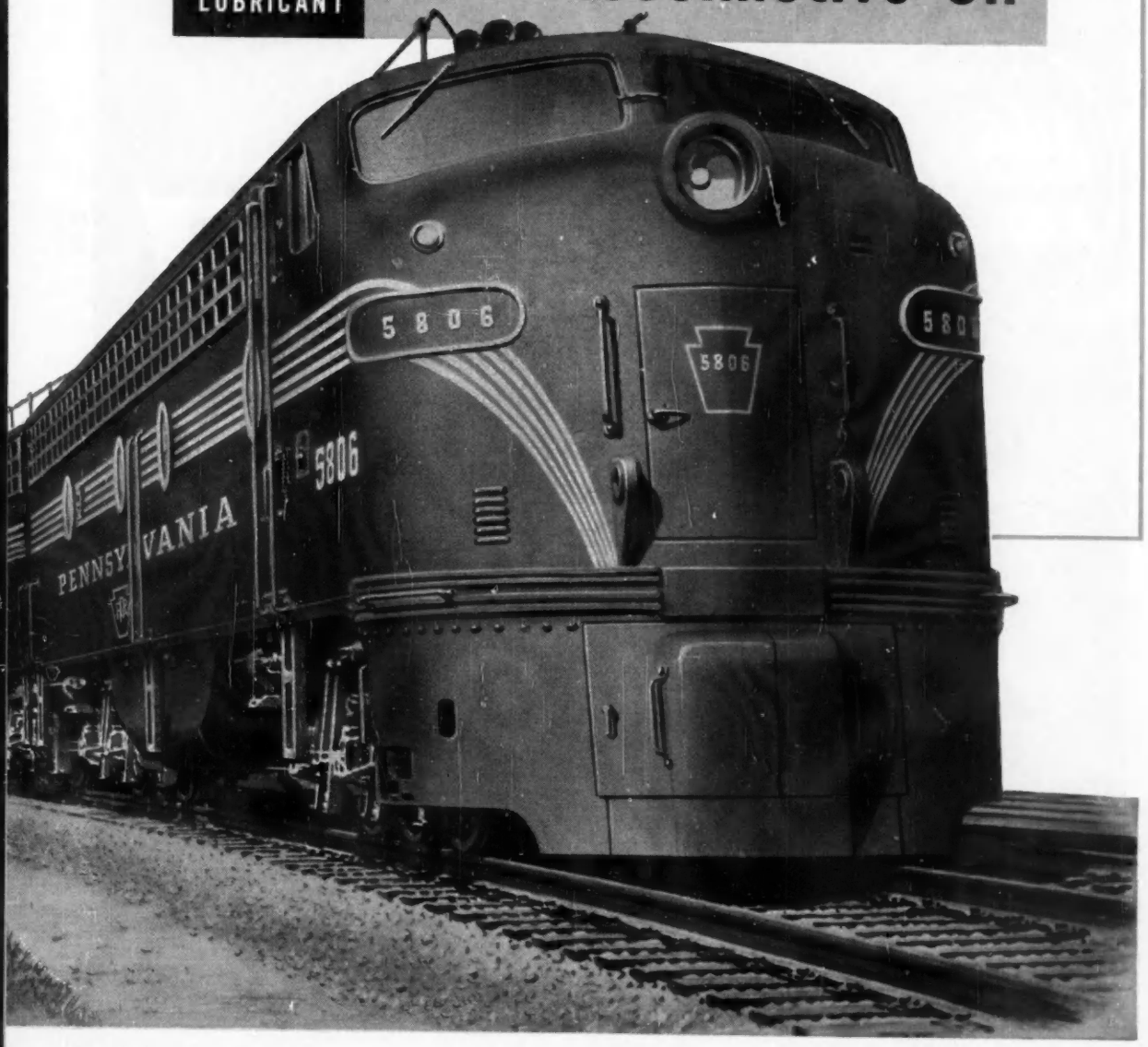
Gulf Dieselmotive Oil



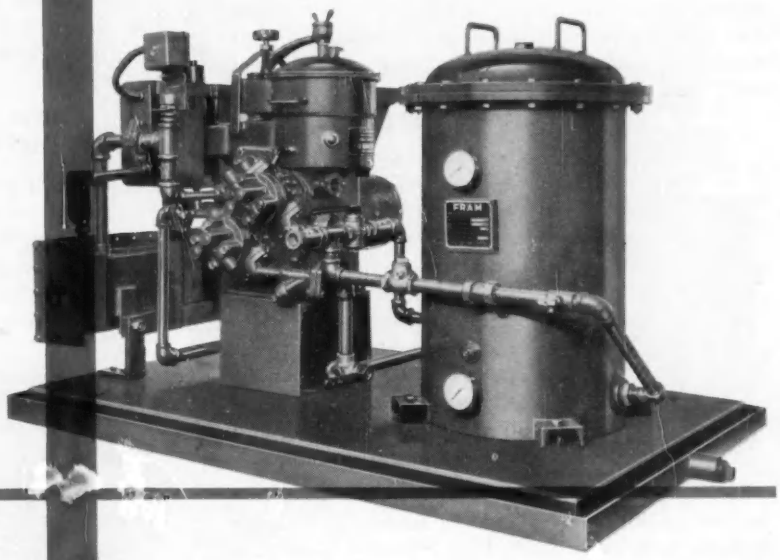
Address inquiries from U.S.A., Alaska, Hawaii and Puerto Rico to: DIESEL ENERGY CORPORATION, 143 Liberty Street, New York 6, N. Y. Certain territories open for distributors.

Water?

Solids?

Colloidal Carbon?

THE DE LAVAL "PURI-FILTER" GETS THEM ALL!



The De Laval "Puri-Filter" is designed to remove *every* trouble-making impurity from diesel lubricating oil.

By *centrifugal* action, it takes out solid contaminants, including gum-forming solids and the water. It *filters* out colloidal carbon and other minute impurities down to *one micron* (0.000039 in.) in size.

In short, the De Laval "Puri-Filter" does a *complete* job of keeping diesel lube oil clean and dry . . . does it dependably, 24 hours a day, month after month. Investigate . . . today!

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lubricating oil purifiers

THE DE LAVAL SEPARATOR COMPANY Poughkeepsie, New York • 427 Randolph St., Chicago 6 • **DE LAVAL PACIFIC CO.** 61 Beale St., San Francisco 5

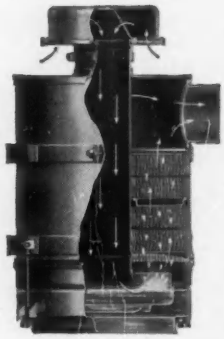
Random Thoughts from a Filter Engineer

by Ned Lamprecht

- **THE VIRTUES OF THE "STACK" TYPE FILTER**
- **WHERE AN OIL BATH FILTER IS NOT THE ANSWER**
- **HOW TO TAKE THE DANGER OUT OF EXHAUST SPARKS**

THE VIRTUES OF THE "STACK" TYPE FILTER

For many years, we have made a "hat" type filter which mounts directly on the air intakes of smaller engine sizes. The air enters radially into the filter which is periodically serviced by removing and emptying the bowl, then refilling with clean oil.



However, there are many applications where a differently designed oil bath filter is required. Thus our "stack" type, so called because air enters through a pre-cleaner or rain hood into a center vertical stack which can be varied in length. In this way, the air intake can be raised above the heavy dust zone encountered on many earth-moving and farm equipment operations.

Servicing is also simplified. An oil container at the bottom can be removed and the accumulated sludge replaced with clean oil. A high efficiency filter with unusually low pressure loss. If you'd like more data, ask us for our special bulletin STOB-1253.

WHERE AN OIL BATH FILTER IS NOT THE ANSWER

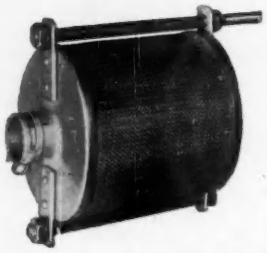
We're great boosters of oil bath filters. And, of course, we think our oil bath filter does a great job of cleaning intake air. But we're quick to admit that there are times when even our oil bath filter isn't the one to use.

For example, where low pressure drop is very important—where there is only ½" to 1" of water static pressure available. Or where a filter must be installed in a horizontal position. Or where low first cost is the main requirement. Or where extremely light weight is a big factor. Or where the dirt load is light, as on board ship.

What should you use in the above cases? We suggest the Unimaze or Multimaze—a washable, viscous impingement type filter. It meets all the requirements of low pressure loss, light weight, low cost and flexibility of mounting. Yet it offers a high degree of efficiency where an oil bath filter is not indicated.

HOW TO TAKE THE DANGER OUT OF EXHAUST SPARKS

A lot of small horsepower engines operate in places where exhaust sparks are a serious problem—timber areas, chemical plants, refineries and warehouses. And in each of these areas, our Air-Maze exhaust spark arresters have been used with considerable success. They work on the principle of the famous "Davey" miner's lamp. Here's how:



Sparks which are simply particles of carbon heated to incandescence strike and adhere to the inside surface of wire screen media. The screen dissipates heat so rapidly that ignition temperatures cannot be maintained on the outside. As a result, the spark is arrested or "dampened".

Air-Maze spark arresters are made of stainless and nickel-plated steel. They clamp on the end of the exhaust pipe. They have a cylindrical design that provides the area necessary to keep back-pressure to a minimum.

Air-Maze spark arresters are now made for small horsepower engines. For further information, write for illustrated bulletin. The Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

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LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

"33,000 HOURS proved the choice was right!"

When a prominent North Carolina community converted its power plant to diesel operation, it called in Sinclair Lubrication Engineer Jim Holt for his recommendations on proper lubricants.

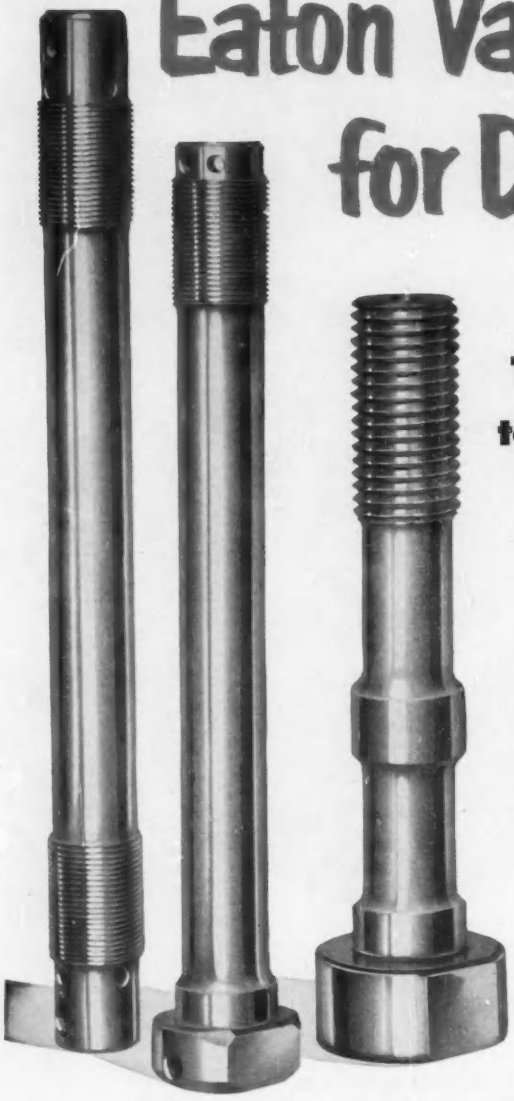
Mr. Holt reports, "I recommended Sinclair RUBILENE® My previous experience convinced me that this diesel lubricating oil would provide maximum wear protection for this power plant's six 1000 K.W. diesel engines. RUBILENE also guards against sticking rings and prevents excessive wear of cylinders, pistons and other moving parts operating continuously for long periods.

"RUBILENE was the right choice," Mr. Holt continues. "After 33,000 hours of near-continuous operation, bearings show very little discernible wear – and there's not a sign of erosive or corrosive action. *Oil consumption is remarkably low,* considering the prolonged operating hours under overload. All six 1000 K.W. engines, with a total output of 6400 K.W. per hour, *use a total of only 1 barrel of oil a day!*"

Why not give a Sinclair Lubrication Engineer the chance to help solve *your* lubrication problem. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N.Y.

SINCLAIR DIESEL LUBRICANTS

Eaton Valves and Bolts for Diesel Engines



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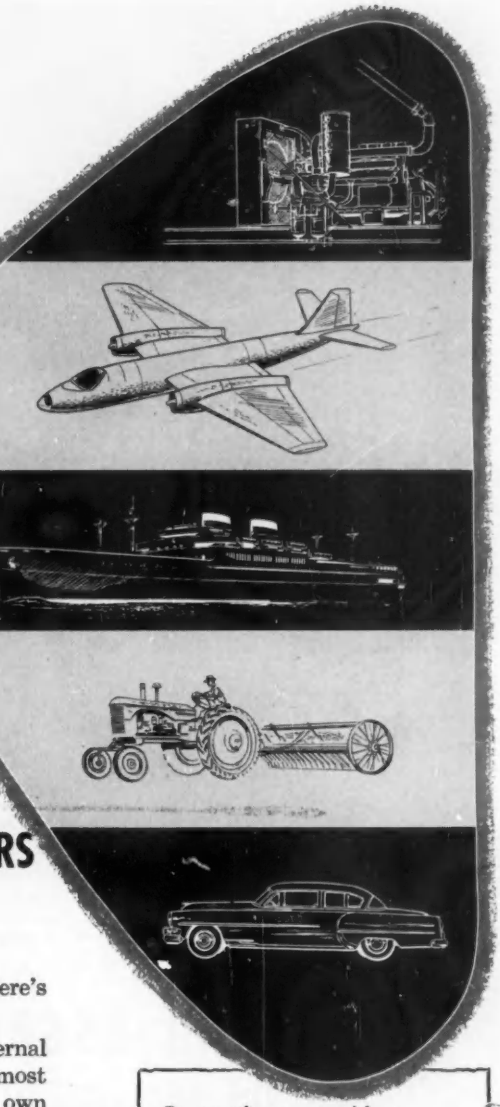

Preferred by more ORIGINAL EQUIPMENT MANUFACTURERS than any other make—

NEXT TIME the question of filtration comes up, here's something worth remembering—

The majority of America's best known builders of internal combustion equipment choose Purolator* filters. In most instances, their choice is based on results of their own impartial tests. Purolator filters—inch for inch, and pound for pound—give finer, more dependable filtration at optimum flow rates.

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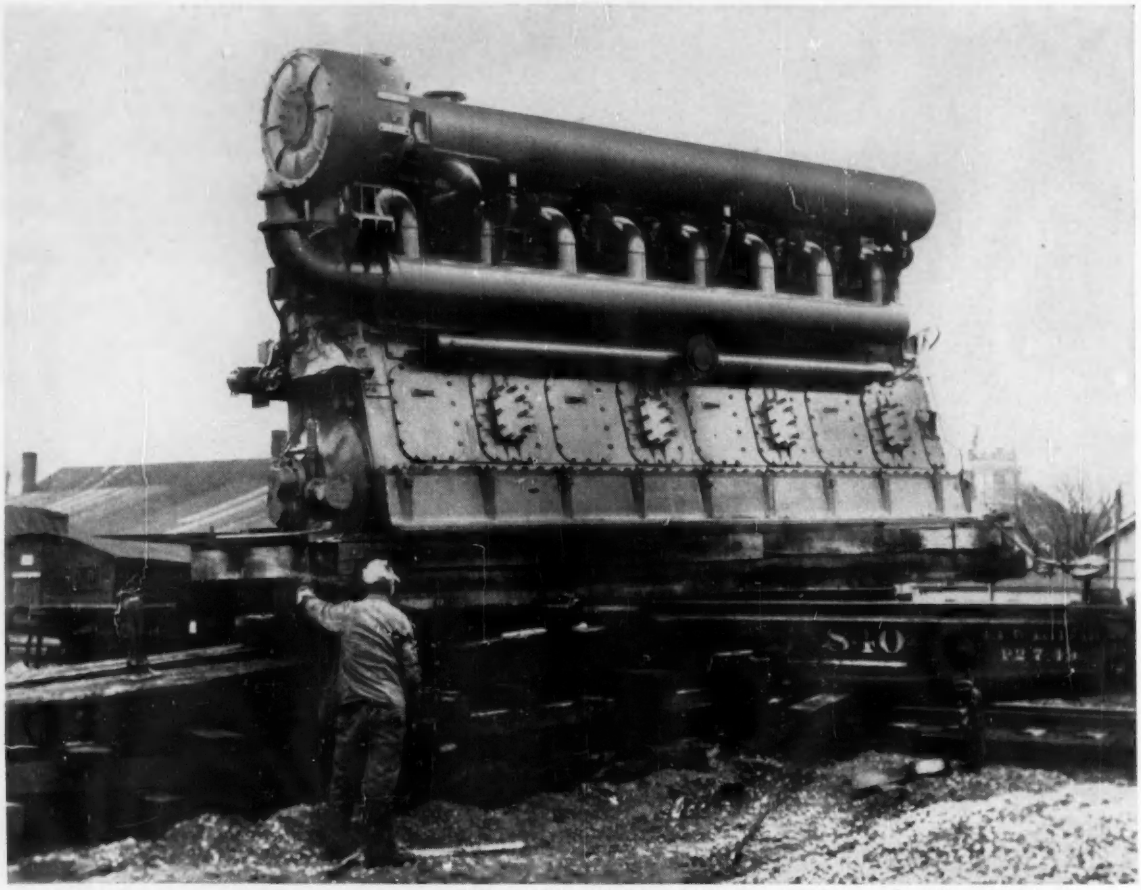

FOURTH WORTHINGTON ENGINE to be installed at the Aitkin, Minnesota, municipal power plant. Every Worthington engine is shipped as a complete unit, factory-tested and ready to be installed by Worthington experts.

No field assembly problems here

When Aitkin, Minnesota, ordered its latest Worthington Diesel engine for its municipal power plant, Aitkin's engineers knew that they were going to get a complete, factory-tested power package, ready to be placed on foundations.

This new SEH-8 1760 hp supercharged Diesel brings the Worthington total at Aitkin to four engines. Repeat orders over a period of seventeen years make this a 100% Worthington installation, with the exception of two air-injection units used for stand-by service. Worthington's engineering help in piping and plant layout has also played an important part in increasing efficiency throughout the entire plant.

Power plant men everywhere agree that when you buy a heavy-duty engine that's completely assembled and tested before shipment, you'll save yourself a lot of unnecessary trouble. And you can rely on Worthington's skilled installation engineers to help you get the most out of your power plant.

Write for Bulletin S-500-B52A. Worthington Corporation, Engine Division, Section E.3.15, Buffalo, N.Y.

E.3.15

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Call in your KWIK-WAY man for a demonstration . . .
See these superior features in action:

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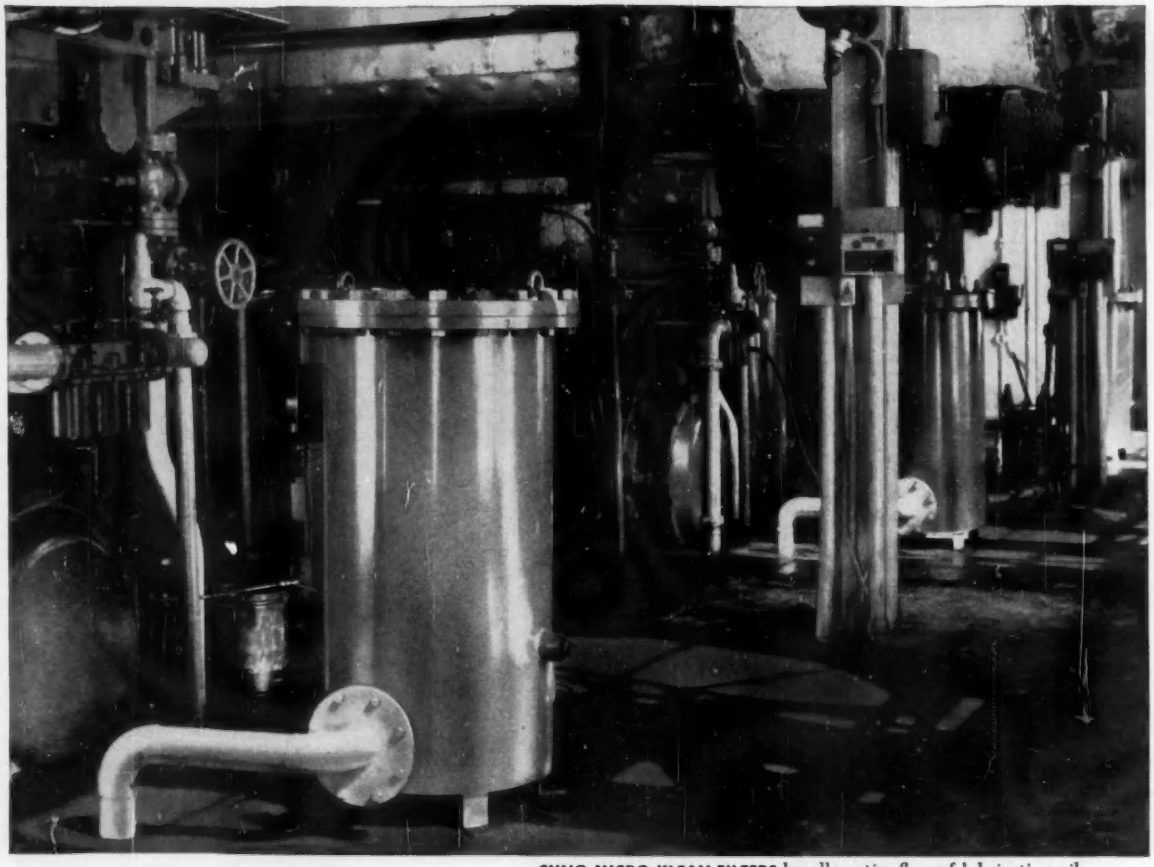

CUNO MICRO-KLEAN FILTERS handle entire flow of lubricating oil through Clay Electric Co-operative's Cooper-Bessemer Diesels.

How Florida electric utility knocked 25% off power production costs

We're talking about the Clay Electric Co-operative, Inc., in Keystone Heights, Florida.

In 1950, when they were burning distillate oil in their five Cooper-Bessemer Diesels, Clay's cost per kilowatt-hour was 9.914 mills. Switching to Bunker C oil in 1953 brought production costs down to 7.629 mills per kilowatt-hour. That's practically 25% in any man's language.

Our part in this success story? Cuno MICRO-KLEAN filters handle the tough job of filtering the entire flow (150 gpm) of lubricating oil through each Cooper-Bessemer. And according to Robert Dodd, Chief Engineer at Clay, the MICRO-KLEAN's are just right. Here's what he says: *"We're very pleased with the performance of the* MICRO-KLEANS. *They're very definitely assisting in making our success possible."* Mr. Dodd goes on: *"I heartily endorse your* MICRO-KLEAN *filters for lube oil service – they fully protect the engine from dirt particles. Trying to cut corners on filters can be false economy of the worst kind."* We agree, Mr. Dodd.

Want to know how MICRO-KLEAN can help solve *your* lube oil problem? Write us today for free MICRO-KLEAN bulletin. Cuno Engineering Corporation, Department 25, South Vine Street, Meriden, Connecticut. 4.11

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By

SCHWITZER -CUMMINS

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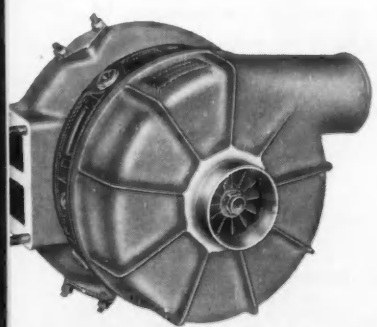
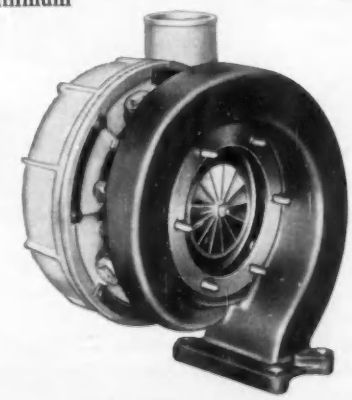


MARINE TYPE
MODEL D 5SM TURBOCHARGER



AUTOMOTIVE TYPE
MODEL D 5U TURBOCHARGER

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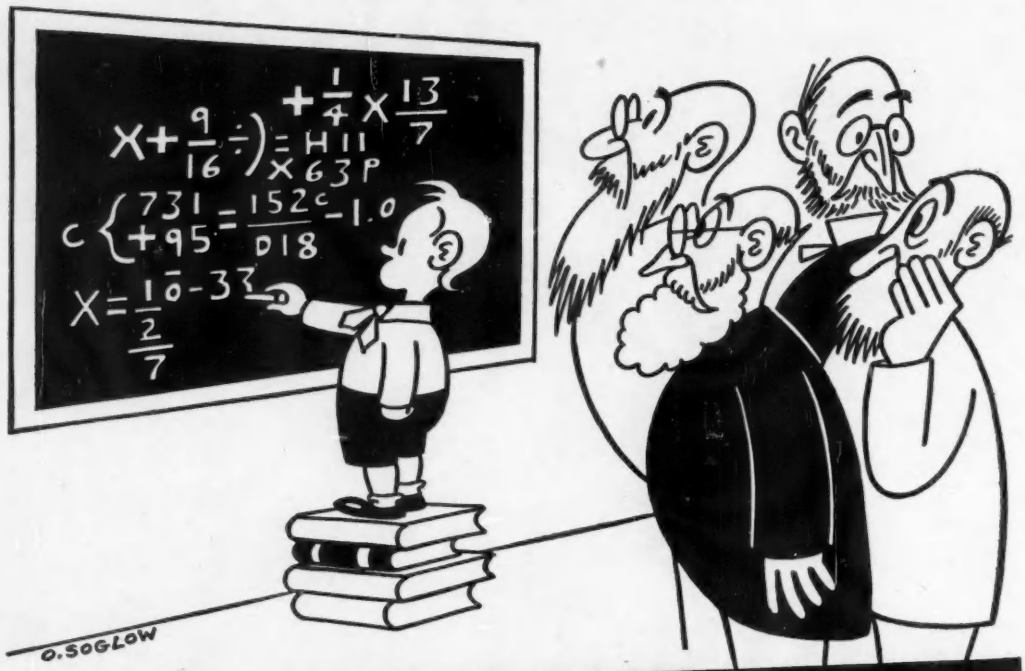

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- Sales of E and H Bonds (H Bond is the current-income companion piece of the E Bond, sold only to individuals and purchased in larger denominations by executives) in 1954 totaled $4.9 billion, a new peacetime record.

- Sales in 1954 exceeded *all redemptions* in that year of matured E Bonds and unmatured E and H Bonds by more than $400 million—the highest net amount since 1949.

- Cash value of E and H Bonds outstanding reached a new record high of $38.2 billion, a gain of $1.5 billion in 1954.

- This $38.2 billion cash holding by individuals represents 14% of the national debt. Never before has the national debt of our country been so widely held.

These figures, far more effectively than mere words, tell the story of The Payroll Savings Plan—why it is good for America, why it is good for business. If you do not have the Plan, or if you have the Plan and your employee percentage is less than 50%, phone, wire or write to Savings Bond Division, U. S. Treasury Department, Washington, D. C.

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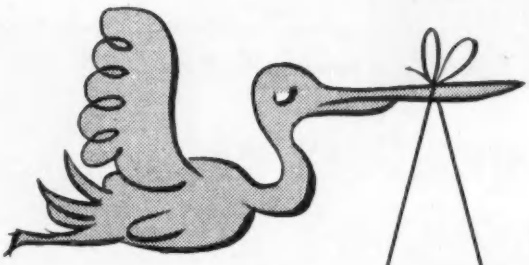

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The Engineer's Report

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PRODUCT *Chevron Starting Fluid*
FIRM *San Francisco Chemical Co, Montpelier, Idaho.*

Fast starts save 50 man-hours each day!

WITH TEMPERATURES DOWN TO 20 BELOW ZERO for weeks, Chevron Starting Fluid speeds up starts of trucks, tractors and shovels at San Francisco Chemical Co.'s phosphate mine at Leefe, Wyoming. Winter temperatures here sometimes drop to 50 below zero, but even then Chevron Starting Fluid makes it possible to start both diesels and gasoline engines. According to Mr. P. S. Pugmire, General Superintendent, this occasionally saves the mine up to 50 man-hours a day — about 2 hours starting time for drivers of trucks and tractors, also time of other workmen who cannot begin work until equipment is operating. Chevron Starting Fluid is available in 1-pint cans and in 7- and 17-cc gelatin capsules. Your supplier also has the new Chevron Pressure Primer System using safe 9.9-cc pressurized steel bulbs which, when punctured, force priming fuel into air intake system, permitting instant ignition.

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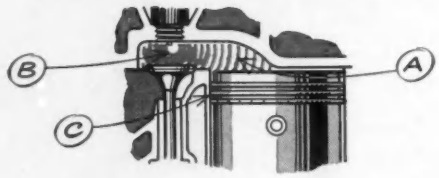
How CHEVRON Starting Fluid Starts Gasoline and Diesel Engines Instantly



A. Atomizes in lowest temperatures and provides easily ignited vapor in combustion chamber.

B. Pressure, or the weakest spark, fires mixture—turns engine and heats air for regular fuel mixture.

C. Contains lubricant and additives—inhibits cylinder wear and ice formation in primer equipment.

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editorially speaking

Yesterday and Tomorrow

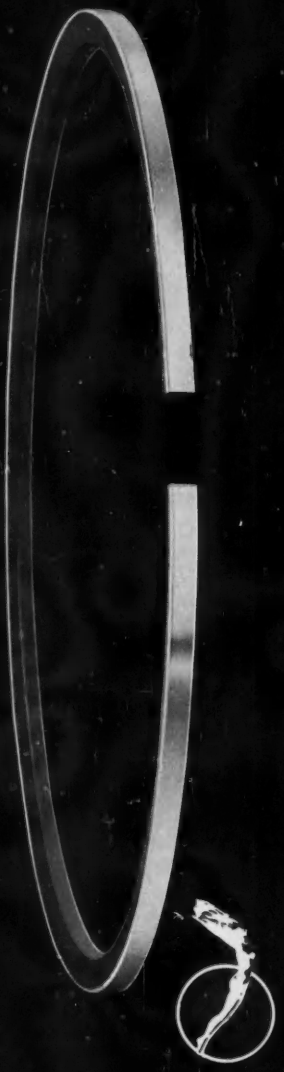
Like the two-faced Janus (no implications, please) on our cover, we look two ways in this issue. What lies ahead for 1955? What was done in the past year? To answer the first question, we know of no better answer than the predictions of Dr. Peter B. B. Andrews. As Pogo might ask, "Who he?" Briefly, he is an economist and market analyst with the knowhow and facilities to do a good job. For a more complete rundown, see the introduction to the first article. We're proud of Dr. Andrews' "Outlooks" and proud of the service that we have rendered in making this important guide available to our industry. His figures—and his record for accuracy has been exceptionally good—show that this year's production of engines promises to be a little better than last year's. Now, the future is but a projection of the past and so like our Roman deity, we face backward to see what was done in 1954. What particular benchmarks can be picked out to perhaps indicate the shape of things to come? To get a broad picture, we asked the engine builders to help us by pointing to one of their 1954 activities which they thought had special significance or of which they were particularly proud. We got some surprises. You may too, when you read the articles. However, we took them at their word, used their comments, interpolated a few of our own, and came up with a pattern for the year. It's not a complete roundup of everything important that was done; it couldn't be in one—or ten—issues. We have just sought to illustrate patterns and trends. And don't forget one important point: accessory builders and suppliers of all kinds had a big hand in making these developments possible. Their energies, their engineering, and their developments, are often the margin between success and failure. So when looking back on 1954's performance, our applause will be for the whole industry team.

BPE

Cyclan

RING IRON

combines the best characteristics of iron and steel!



- Equals or surpasses the wearing quality of cast iron.
- Approximates the strength of steel.
- Has extra high impact value for shock resistance.
- Retains true shape even after much deflection.
- Stands up in super-charged engines.
- Can be readily chrome-plated.
- Functions efficiently without chrome plating.
- Has high resilience—excellent bearing characteristics.
- Now used for original equipment in heavy-duty engines.
- Now available for replacement use.

Cyclan is exclusively a Sealed Power development

Write for "The Cyclan Story"

SEALED POWER CORPORATION
MUSKEGON, MICH.

Sealed Power
PISTON RINGS · PISTONS
CYLINDER SLEEVES

highlights

- At the New Haven Arena a pair of 180-hp Chicago-Pneumatic diesels, turning at 600 rpm, supply all the light and power for the arena, a block of stores, parking area, and ice plant.

- Super Service Motor Freight Co., Inc. recently ordered 12 more White tractors powered by 200-hp Cummins engines. Super Service already has 140 of these in service.

- Ireland's railroads are well along in their dieselization They are in the process of adding 113 diesel-electric locomotives at the present time. A few of these units are already in service.

- Sign of the times—increased use of diesel oil as railroad power. The Missouri Pacific soon will be completely dieselized with 873 diesel locomotives instead of the 104 with which they began their diesel program in 1947.

- It was recently reported that Nordberg is installing a 29-in bore engine in the Ponca City, Oklahoma municipal power plant. The engine in question is said to be the first Nordberg of this bore diameter to be installed as a dual-fuel engine.—This should be interesting to watch.

- Mack Trucks, Inc. will present 20 new models ranging from city-delivery size to the largest tractors for the West Coast. Tooling and production facilities were recently OK'd by Mack's board of directors. Parts interchangeability will reportedly be at the highest percentage in Mack's history.

- A 12-cyl Nordberg radial engine was installed at the St. Ignace plant of the Edison Sault Electric Company for peaking and standby service should hydroelectric power from Sault St. Marie be interrupted. Since its installation in March 1953, the Nordberg engine, which drives a 1440-kw Elliott vertical generator, has been used more and more as a base load plant.

- API tells us that the demand for diesel fuel has increased at a rate of about three times that of gasoline.

- More than half the oil wells in the U. S., although some are more than 50 years old, are still producing, according to the Oil Industry Information Committee.

- Physicians Hospital at Plattsburg, New York has installed a 500-hp Fairbanks-Morse diesel to insure a continuous source of power in the event of a local power outage or other emergency.

- As of November 1st, 1954, Class I railroads owned a total of 23,643 diesel-electric locomotive units normally operated as 16,993 locomotives. A total of 148 new units were on order as of this date.

- Blood plasma processing for the armed services in a Michigan processing station is safe-guarded from mainline power interruption by a GM diesel generator set. The set was installed because any interruption of the 48-hr process could result in loss of plasma as well as damage to the processing machinery. The standby unit is fully automatic in operation.

- "Fundamentals of Friction and Lubrication in Engineering" has just been published by the American Society of Lubrication Engineers. It represents the proceedings of the first ASLE National Symposium and is available from the society at 84 East Randolph Street, Chicago 1, Illinois.

- In England, we note that large orders have been placed for diesel-powered switchers, but the diesel-powered road locomotives can be counted on your fingers. Steam locomotives, operating at a thermal efficiency of about 5% continue to be the main source of power for mainline trains. Lightweight diesel-powered trains for shorthaul passenger service are being placed in service however, according to the British magazine, Gas and Oil Power.

How many new engines will be produced in 1955? That's the important question answered in the "Outlook" . . . .

For many years the diesel engine industry lacked a measure of the yearly production and application of diesel, dual-fuel and gas burning engines. How did the industry plan? And above all how did the suppliers, so vital to our industry, project their planning? What was the potential market? How much could be justified for research and new equipment?

Diesel Publications, Inc. filled this vacuum when in 1951 *they published the first of the Andrews' board studies, forecasting engine production for* 1952. *This was followed up each year and here is the result of the latest study as it applies to* 1955. *Essential findings are given along with recapitulations covering the past five years.*

What is the "Andrews' study" and what is its accuracy? Dr. Peter B. B. Andrews is a marketing economist with an impressive background. Currently he heads up a 300-*man board of analysts that produces* Future Sales Ratings *of the country's* 100 *leading industries. Quarterbacking this team, he compiled the figures for this forecast. As to accuracy, a revision of estimates for* 1954, *made some two months before the year's end, indicated that the industry would finish the year within* 6.7% *of its predicted* 1954 *goal!*

INTRINSICALLY outstanding characteristics of the diesel engine, including dependability, efficiency, and economy, continue to impress the board generally. The diesel represents one of the best prime movers available for cost reduction by American business. Consensus of the board indicates the top 5-star rating for the sales potential of diesel engines in 1955.

Only one of nine major usage categories is rated as having lower potential sales in 1955 than in 1954. This reflects the recession in Agriculture, but the potentials of the remaining eight, including Railroads, Highway Transportation, Marine, Municipal, General Industry, Petroleum, Mining, and Construction, are rated as higher than for 1954.

Agriculture, in any event, is believed to be close to turning the corner and even with the anticipated small decline, this market is one of the greatest for 1955. In the case of Railroads, the sales potential naturally shrinks as the proportion of full dieselization grows.

The 1955 market therefore is viewed by the board as being potentially greater than 1954 as a whole. It is almost uniformly indicated, however, that competition will be greater from both within and outside the diesel industry. With intensive and ingenious-enough selling and promotion campaigns in 1955, there is felt to be little doubt that the nation's expenditures for diesels could be historically among the best.

Now let's see what the study has to say about specific fields of usage.

Railroads

"Every important part of the success story in diesel engines is intertwined with their widespread and effective adoption by the railroad industry. At the end of June 1954 there were 75 Class I railroads performing 100% of their freight service gross-ton miles by diesel power; 25 more used diesels for more than 90% (13 of these were 99% or better); and 10 used diesel for more than 80%. Thus, 110 of the 127 Class I railroads now handle over 80% of their freight service by diesel locomotives.

"In 1954, railroads cut capital expenditures sharply, especially in the equipment field. In 1955 the situation is expected to improve. The estimate of 1200 new diesel-electric units for Class I railroads and 77 units for other railroads is based on the optimistic assumption that railroad business will pick up sufficiently to provide both the incentive and the money to buy these additional diesels.

"New diesel-electric units installed in past years and estimated for 1954 and 1955 run as follows:

Year	*Class I Railroads*	*Other Railroads*	*All U.S. Railroads*
1955 (Est.)	1200	77	1277
1954 (Est.)	1100	71	1171
1953	2122	79	2201
1952	3035	105	3140
1951	3490	172	3662
1950	3191	212	3403

Highway Transportation

"Better roads are likely to give truck and bus highway business additional stimulus in the future. An all-time high Federal-aid road building program has now been authorized, and constant improvements are being made in truck and bus design and engine efficiency for better utilization of the new and improved highways. The belief is definitely growing both among public officials and highway experts that a tremendous projected 10-year $20,000,000,000 Federal-financed program to bring the 38,000-mile national system of interstate highways up to modern standards can be realized without budget deficits."

Year	*Truck*	*Bus*	*Total*
1955 (Est.)	13,000	3400	16,400
1954 (Est.)	12,110	3320	15,430
1953	13,584	2806	16,390
1952	14,689	3157	17,837
1951	17,103	4662	21,765
1950	14,620	2409	17,029

Note: Figures include Engine Replacement

Marine

"While vessel building completions are expected by the board to decline somewhat in 1955, a strong situation is shaping up for inland waterways vessels, also for fishing and workboat fleets.

"As the cold war continues, the need for greater shipping strength on the seas and inland waterways becomes more evident and brings more Government assistance. The board notes an impressive boom under way in inland waterways. Reflecting their increasingly important role in transporting the nation's commerce, inland waterway carriers may account for a record-breaking total of 75,000,000,000 ton miles in final figures for 1954, a gain of about 14% over 1953."

Year	*Vessels Over 100 Gross Tons*	*Diesel Engines for Smaller Vessels*
1955 (Est.)	120	2290
1954 (Est.)	97	2225
1953	126	2119
1952	114	1966
1951	81	2162
1950	77	1869

Municipal and Utility

"Virtually all electrical power generation facilities throughout the country are being taxed by increasing demand from industrial uses, the unabated population boom, and the increasing use of electrical power per capita. More generating capacity will be needed in both municipal power plants and in public utilities.

"New and more powerful engines will be needed in municipal plants to supplement existing capacity either as additional engines or for supplanting older, less economic units. Besides electric power generation, municipalities use diesels, dual-fuel, and gas engines for such purposes as drainage or water pumping, sewage disposal,

sanitary filling, road building and repair, and many other uses.

"Total spending by public utilities for expansion of new plant and equipment in 1954 approximated $4,900,000,000—an increase of about 10% over the 1953 figure. With distribution problems increasing, some of these expenditures go for purchasing diesel engines for peaking, end-of-the-line, and emergency standby service.

"Diesel engine sales estimates are as follows:

Year	*Installations*
1955 (Est.)	443
1954 (Est.)	425
1953	392
1952	355
1951	450
1950	436

General Industry

"In a competitive economy such as the present, when cost-saving assumes more and more a vital aspect, the board believes markets can be expanded in such industries as steel, which spent over $1,000,000,000 in additional plant and equipment in 1954; primary non-ferrous metal industry which spent over $500,000,000 last year; fabricated metal products industry which spent over $350,000,000 in 1954; stone, clay, and glass which spent about $300,000,000; textiles at $300,000,000; paper at $400,000,000; beverages at $320,000,000; food and related products at $500,000,000; chemicals and allied products at $400,000,000; petroleum and coal products at $3,000,000,000; and rubber products at $125,000,000.

"Working capital of American corporations now is at an all-time high, exceeding $91,000,000,000, with current assets more than double all the current liabilities. In the light of such expansion it follows that there will be increased applications for engines in roles varying from industrial locomotives, cranes, etc., for materials handling to units for standby power. The board views the year 1955 as having a greater sales potential for diesels than in 1954. Specific estimates and background data for past years follow:

Year	*Engines*
1955 (Est.)	12,800
1954 (Est.)	11,200
1953	15,780
1952	12,987
1951	13,146
1950	12,378

Petroleum

"Record-breaking numbers of cars and trucks on the roads, unprecedented and growing numbers of oil burners for heating, new highs for diesel engines in use, new peaks in demand for lubricants, are only a few of the factors pressing for increasing activity in this industry. Supplying all the equipment needed by the petroleum and related industries is a business running over $1,000,000,000 annually.

"The drilling and transportation divisions of the petroleum industry use diesel or gas engines. Engines used directly by this industry are estimated below."

Year	*Engines*
1955 (Est.)	4530
1954 (Est.)	4310
1953	4280
1952	4164
1951	3903
1950	3546

Breakdown by fields of application of the estimated engine sales for 1955 with comparative figures for the preceding five years.

	1955 Projected	1954	1953	1952	1951	1950
Railroads	1,277	1,171	2,201	3,140	3,662	3,403
Highway Transportation	16,400	15,430	16,390	17,837	21,765	17,029
Marine	2,290	2,225	2,117	1,966	2,162	1,869
Municipal	443	425	392	355	450	436
General Industry	12,800	11,200	10,780	12,987	13,146	12,378
Petroleum	4,530	4,310	4,280	4,164	3,903	3,546
Mining	3,295	3,150	2,635	1,950	2,325	2,317
Construction	27,700	26,200	28,400	25,286	28,583	27,468
Agriculture	46,000	47,900	58,158	68,327	70,000	70,063
TOTALS	114,835	112,011	125,353	136,012	145,996	138,506

NOTE: *Figures are estimated sales of all sizes and types of diesel, dual fuel, and gas burning engines*

Mining

"This industry is expected to be a bigger taker of diesel engines as their popularity grows underground and their usage advances with the increasing spread of open cut and strip mining. In the past year mining interests of the U. S. spent not far from $1,000,000,000 for new plant and equipment, compared with $891,000,000 for the year 1953.

"The future of the nation's great expanding economy is viewed by the board as inevitably requiring much more raw material with added pressures on mining and further expansion of the plant and equipment of this important basic industry. Sales potential for 1955 compared with preceding years are computed as follows:

Year	*Engines*
1955 (Est.)	3295
1954 (Est.)	3150
1953	2635
1952	1950
1951	2325
1950	2317

Construction

"Total new construction in 1954 beat all preceding records, and prospects remain bright. Only 45% of all plants and equipment combined is of postwar date; about 55% was acquired during World War II or before.

"Further basic stimulus to construction and therefore to the great diesel demand inherent in this industry, comes from the steadily increasing population pressure. States and municipalities, moreover, have enormous amounts of pending expenditures for new schools, churches, hospitals and other institutions, sewage systems, highways, etc. A $32,000,000,000 backlog in road construction alone exists. Following is the 1955 estimate compared with other years.

Year	*Engines*
1955 (Est.)	27,700
1954 (Est.)	26,200
1953	28,400
1952	25,286
1951	28,583
1950	27,468

Agriculture

"Although the board feels that full recovery in farm spending power is not immediately pending, the consensus is that the settlement of farm legislation and the requirements of the nation's fast-growing population will entail a high rate of activity in agriculture in 1955.

"There is every reason, in any case, why aggressive and ingenious selling should be productive in this field for 1955; financial condition of the farmer is strong generally and agricultural income is no longer sagging. For the year 1954, total farm income was but little changed from the $16,100,000,000 final figure for the full year 1953.

Consensus of estimates for diesel engine sales in 1955 and a comparison with previous years follows."

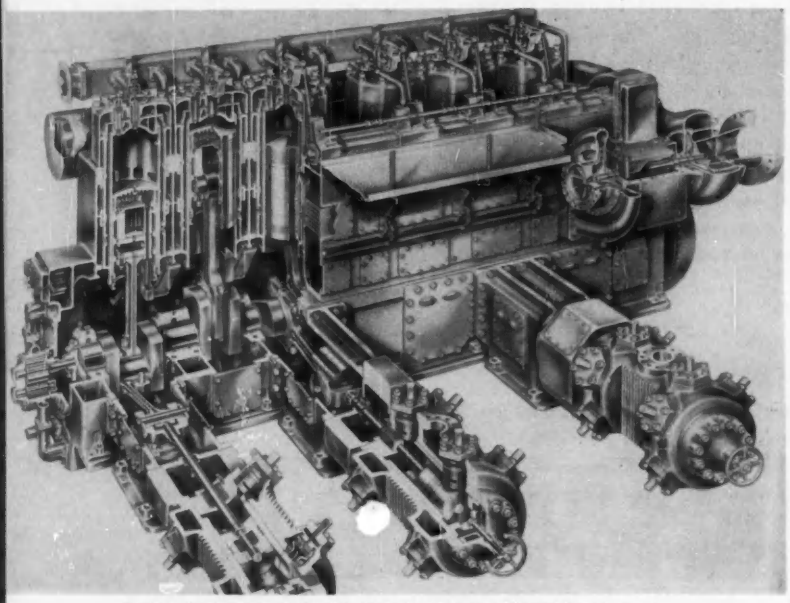
Year	*Engines*
1955 (Est.)	46,000
1954 (Est.)	47,900
1953	58,158
1952	68,327
1951	70,000
1950	70,063

A consolidation showing horsepower estimates for the 1955 projected engine sales figures in each of the nine usage fields based on the estimated horsepower range and unit average for each field.

		1955 Projected Engines	1955 Estimated Horsepower
Railroads Horsepower Range 200-2400	Estimated Average 1200 H.P.	1,277	1,532,400
Highway Transportation Horsepower Range 120-200	Estimated Average 140 H.P.	16,400	2,296,000
Marine Horsepower Range 165-4800	Estimated Average 400 H.P.	2,290	916,000
Municipal Horsepower Range 200-3600	Estimated Average 1250 H.P.	443	553,750
General Industry Horsepower Range 60-3600	Estimated Average 300 H.P.	12,800	3,840,000
Petroleum Horsepower Range 60-2400	Estimated Average 300 H.P.	4,530	1,359,000
Mining Horsepower Range 60-550	Estimated Average 150 H.P.	3,295	494,250
Construction Horsepower Range 60-550	Estimated Average 150 H.P.	27,700	4,155,000
Agriculture Horsepower Range 30-180	Estimated Average 75 H.P.	46,000	3,450,000
		114,835	18,596,403

Turbocharging of 2-cycle engines was hailed as a milestone in the industry's technology . . . .

Many people said it couldn't be done; energy level in the 2-cycle engine exhausts was too low. But they did it, with the aid of turbochargers with higher overall efficiencies and new engineering concepts. They did it in Europe with diesel engines and in this country with natural gas engines. Clark Brothers was the first to announce such a unit. They built their own turbocharger featuring it in a system wherein the blower was driven mechanically until the exhaust energy reached the point where it could take over and the turbocharger operate independently.



Sectionalized view of Clark's turbocharged, 2-cycle angle compressor. A mechanical drive, with overrunning features at normal loads, drives the turbocharger only during starting and low load operation.

Clark's Turbocharged Angle Compressor

CLARK Models TRA and TLA were the first turbocharged 2-cycle gas engine-driven compressors built. Both engine models and their turbochargers were designed and built by Clark specifically as matching units. They were a new concept in integral engine-compressor design.

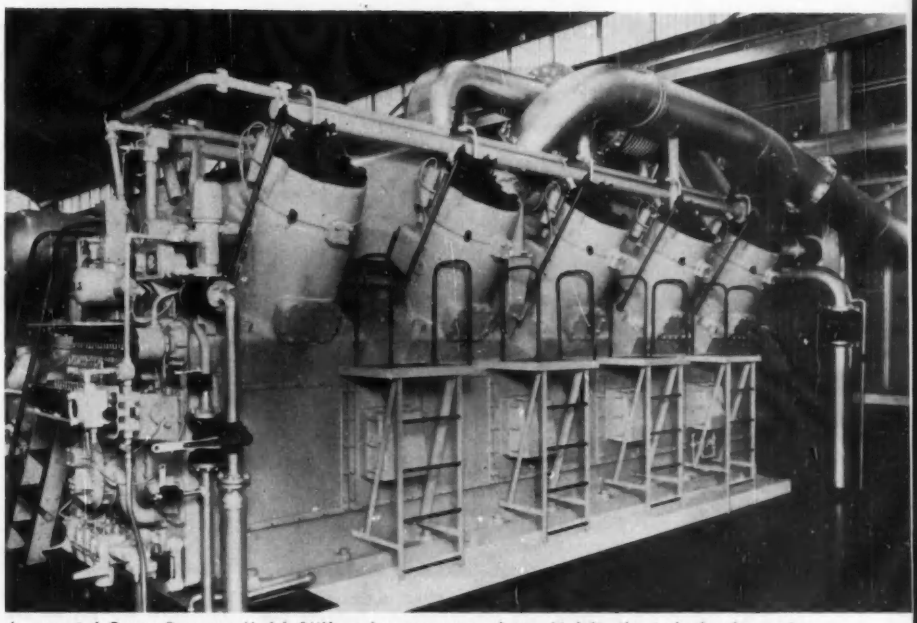
These massive new units are conservatively rated to incorporate an even greater safety factor than their non-turbocharged predecessor, even though horsepower has been increased as much as 65% on some units. Due to the unusually high efficiency of the turbocharger, an air volume of such proportion is available for power cylinder scavenging and air cooling, that mean cylinder wall temperatures are lower than those of comparable non-turbocharged units.

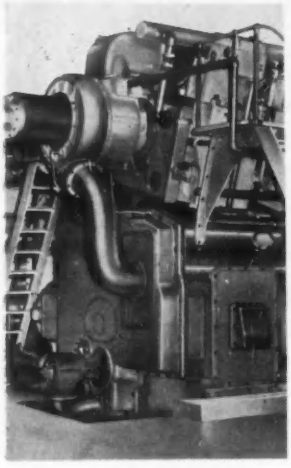
Other design features include rigid block-type construction; removable, water-jacketed power cylinder liners; built-in intercoolers; precision bearings; forged crankshafts; and many other features. These in-line units assure a substantial reduction in installation costs in addition to lower fuel and water costs.

The TRA is a 14-in bore, 14-in stroke unit, built in 6-, 7-, 8-, and 10-cyl models rated at 1100 to 1800 bhp. The Model TLA is built in 6-, 7-, and 10-cyl sizes, rated at 2000 to 3300 bhp per unit.

An impressive number has been placed in operation, while new orders indicate a ready acceptance of these new, efficient, powerful, and compact units. Eight of the new 2000-bhp TLA-6 units are now operating on a new gas transmission pipeline. Their operation, including start-up, loading, and shutdown, is controlled entirely by pushbutton.

Cooper-Bessemer did it too. Many years of study produced a self-sustaining turbocharging system which they applied as a conversion to an existing engine model. It is a commentary on the great improvement in turbocharger efficiency since a commercially available model was used. Here is what was done and some of Cooper-Bessemer's thinking on the subject.





A converted Cooper-Bessemer Model GMV engine-compressor above. At left, the turbocharging system for conversion has been designed for easy application, and integration with existing engines.

Cooper-Bessemer's 2-cycle Turbocharging

EARLY in December 1953, Cooper-Bessemer put a turbocharged 2-cycle engine in pipeline service. One of their Type GMV-10 turboflow engines was converted for the purpose. This 14-in by 14-in engine was normally rated at 1100 hp, but after conversion it operated at horsepowers between 1350 to 1500. At the latter figure the bmep is approximately 92. Fuel consumption at this point was in the order of 7400 Btu per bhp hr. As stated, this was a conversion having a few slight handicaps over a new engine.

Studies of 2-cycle turbocharging predated this event by many years. Preliminary work encompassed the idea of various devices to aid during starting and at light load, but a concentrated program over a 2-year period proved the feasibility of self-sustained turbocharger operation both during starting and through the load range. This was the experience incorporated in the conversion of the GMV-10 engine.

Since Cooper-Bessemer has both the "know-how" and facilities to build a new engine of this type, their reasons for delaying doing so are of interest. Their GMVA engine of the same bore and stroke is fitted with a well designed gear-driven centrifugal blower that is producing comparable results at practically the same costs for the supercharging equipment. Since the fuel consumption rates are about the same for both engine types, there is little if any advantage to be gained at this time and in the light of present knowledge.

It is their feeling that there is the most to be gained, particularly with respect to improvement in fuel consumption, in the conversion of existing engines. Many earlier models are now operating with consumptions between 8000 and 10,000 Btu per bhp hr. Here, substantial reductions are possible. Application of the turbocharging system to the engine had been engineered so as to facilitate the conversion.

Worthington had been working on the problem for a long time and came out with a conversion unit followed by a specially designed version of the same engine for turbocharged application. They also use a commercial turbocharger, in fact, several types will do the job. Their system is self-sustaining too, with turbocharger operation independent of any mechanical drive during starting and throughout the load range.

A Worthington Model SUTC under construction. Two commercial turbochargers are used here with aftercoolers between each turbocharger and the air box.

Worthington's Type SUTC Engine

THE first Worthington Type SUTC-8, 2000-hp turbocharged 2-cycle angle gas engine compressor unit was put "on the line" at the East Bernard Station on the Tennessee Gas Transmission pipeline system on May 17, 1954.

This was the first field conversion unit. Tennessee Gas has realized a 25% increase in power, 20% better fuel consumption over the original UTC 1600-hp rating, and to date has had over 3000 hr of continuous field operation.

A second converted unit duplicating the East Bernard installation was completed at their Jasper, Texas compressor station and started on November 9, 1954.

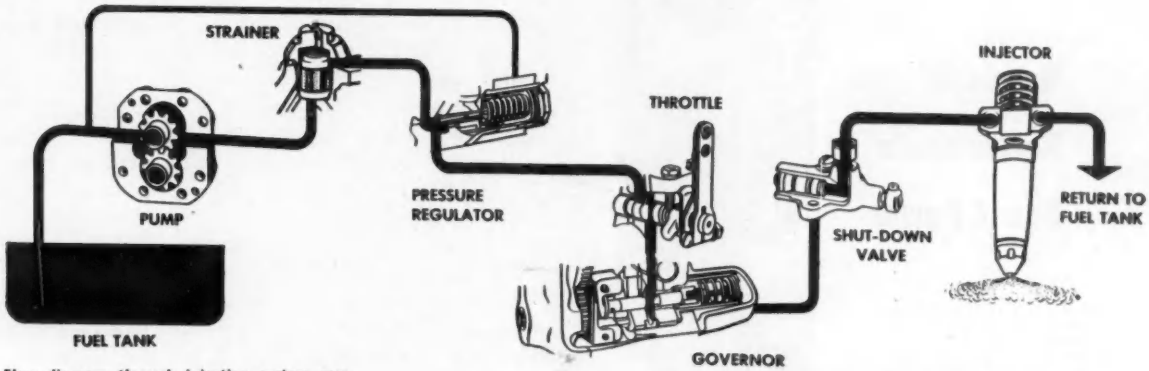
The first newly built version is shown under construction. Extensive research on this SUTC-8, 2000-hp engine, has proven the complete reliability of the adoption of the "pulse-type" turbocharging system as applied to the "Uniflo" 2-cycle design. These turbochargers operate completely independent of any requirement for an auxiliary drive for starting or on light loads. Response to rapid load increases is exceptionally quick. Constant speed operation at no load, as well as any increment of load to full rated horsepower, is realized.

Scavenging air temperatures are controlled to avoid the possibility of detonation. Compressed air from the turbocharger is passed through aftercoolers before entering the air box. This lowers the charge temperature at the start of compression.

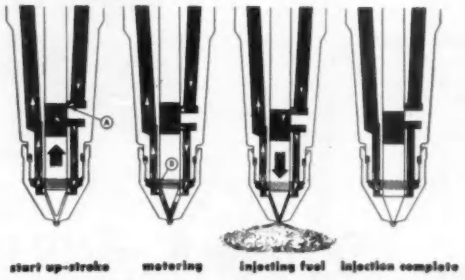
Improvements of over 20% in fuel consumption over a standard pump-scavenged design, together with an exceptionally quiet running unit, resulted from the new design. This unit is currently offered in seven cylinder combinations from 3- to 10-cyl unit sizes, with ratings from 750 to 2500 bhp at 320 rpm.

New components, engine redesign, and new engine models show the application of the latest technology . . . .

You start with an idea. It may be a way to do something more simply—or cheaply. It could be a means for getting greater power from an engine. Or perhaps better fuel consumption. Then again it may be a whole new concept for an engine to meet some particular need. Study and research starts, things are built, and soon there is something new in industry. Look at some of last year's developments.



Flow diagram through injection system components. Injector sequence is shown at right.



Cummins Adopts a New Fuel Injection System

CUMMINS points to the development of their new PT fuel injection system as being outstanding for the year. The significance of the system lies in the fact that it is a move toward cheaper fuel injection equipment, easier maintenance, and reduction of operating costs. Parallel advances were made toward the same goal by the commercial makers of fuel injection equipment.

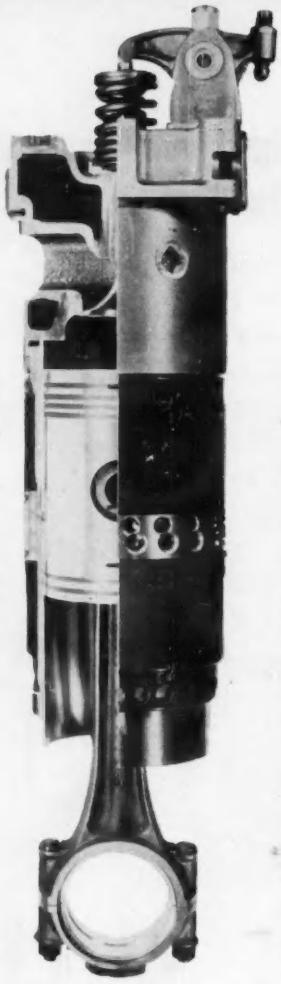
This development was a part of Cummins' research program aimed at producing lighter, higher speed units with improved efficiency. All this will make their engines more competitive with other forms of power. Research is continuing as evidenced by the 60% expansion in their research facilties that has just been completed. New designs and improvements are in the wind for -1955 and future years.

The new PT system (DIESEL POWER, August 1954) is based on the fundamental principle of hydraulics that the amount of flow through a fixed orifice will vary with the pressure of the fluid and the time of flow. They put this principle to work using simple components. These are a gear pump, a pressure regulator, a throttle, a simple governor, and an injector for high pressure injection of the fuel. A strainer and a shut-down valve are safeguards.

The system has demonstrated its ability to work at high engine speeds without functional impairment. The absence of ultra-high precision parts common to some conventional injection equipment, and the simple mechanical nature of the components makes it possible to make any repairs necessary without special tools. No timing is required since the only timed component, the injector, receives its actuation from the engine camshaft.

All-in-all, the system offers a good basis for other phases of engine development. With Cummins' emphasis on research and recognition of the constantly changing needs of engine users, we can look forward to better engines from both an operational and competitive point of view.

Adaptable to either automotive, marine or industrial service, Harnischfeger's C-18 series now has more power in the same package. Power assembly is shown.



Harnischfeger Refinements Boost Power

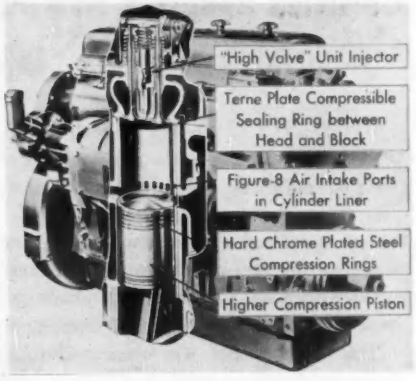
TYPICAL of what can be done by refinement in engine design, several developments incorporated in Harnischfeger's P&H diesels add up to an actual increase in output of 36% over former models. The new C-18 engines turn at higher speed, now operating continuously at 1800 rpm. Applications in various services have thoroughly proved their added performance.

Harnischfeger Corporation, in reviewing the many developments that have gone into the Series C-18 diesel, points to its improved cylinder assembly as typical. This was redesigned for greatly improved efficiency and longer service life. With a new porting and valving arrangement, more effective and complete scavenging is achieved. Greater turbulence is produced, further improving engine efficiency. P&H's new-design combustion chamber with flat-top pistons is held to account for cleaner, more thorough combustion.

Cooling capacity of engines has been much increased over earlier models through the enlargement of water passages and the addition of new channels in vital areas. The entire liner now receives uniform cooling. Effective heat dissipation below the port area is achieved through drilled water passages between the rows of ports.

Compression ratio of P&H diesel engines is 16:1. Every model has the same 4.5-in by 5.5-in bore and stroke as the patented "Power Assembly", is interchangeable throughout the entire series—2, 3, 4, and 6 cylinders. This lightweight unit can be replaced easily by even an inexperienced operator in a matter of minutes, without dropping the oil pan. This unitized assembly consists of head, liner, pistons, and rod.

GM's "71" Cylinder Assembly was Redesigned


"High Valve" Unit Injector
Terne Plate Compressible Sealing Ring between Head and Block
Figure-8 Air Intake Ports in Cylinder Liner
Hard Chrome Plated Steel Compression Rings
Higher Compression Piston

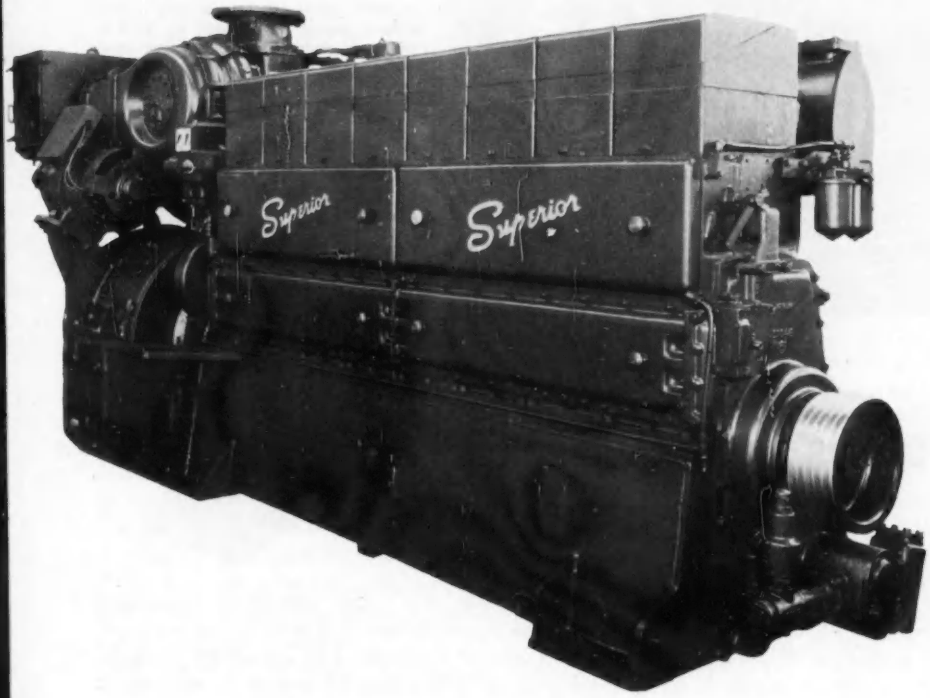
Latest GM "71" design changes are summed up in the illustration. GM has carried on a continuous refinement program for this and other engines since the end of World War II.

SOMETIMES engine refinements are incorporated in production models step-by-step. Some benefits are gained in performance and/or service life as each modification is made. However, because of the interrelation of engine components and functions, full benefit is not received until the whole program is complete. This is what happened in the refinement program of the Series 71 engine's cylinder assembly.

One of the first things done was to alter the method of sealing the block-to-head juncture. A metal-to-metal fit with sealing rings for the oil and water and a special laminated compressible ring-type gasket between the head and each liner flange was used. The tight, positive seals paved the way for sealing higher pressures. In preparation for better breathing, the exhaust valve timing was altered and a switch made from 45-deg to 30-deg valve seats. At the same time rocker arms were improved and simplified.

Then last year saw the introduction of the new high-valve injector. The injector valve, the spring, and the check valve were moved upward away from the high-seat zone by alteration of the parts. By running cooler, life was increased, and again, this would be important if temperatures and pressures went higher.

The final group of changes included the adoption of a new liner with increased port area, a piston for higher compression, and new chrome-plated steel piston rings. Approximately 30% more area was provided by the new liner porting; the piston was designed for effective utilization of the increased air; and the piston rings were capable of withstanding higher loading. And with the earlier modifications in timing and valve design, the combined result was a boost in power rating with decreased fuel consumption rates.



"One for the road" Superior's Model 40C for locomotive service. Arrangement of exciter and turbocharger makes maximum use of vertical height to shorten unit.

Superior Model 400 Diesel Redesigned

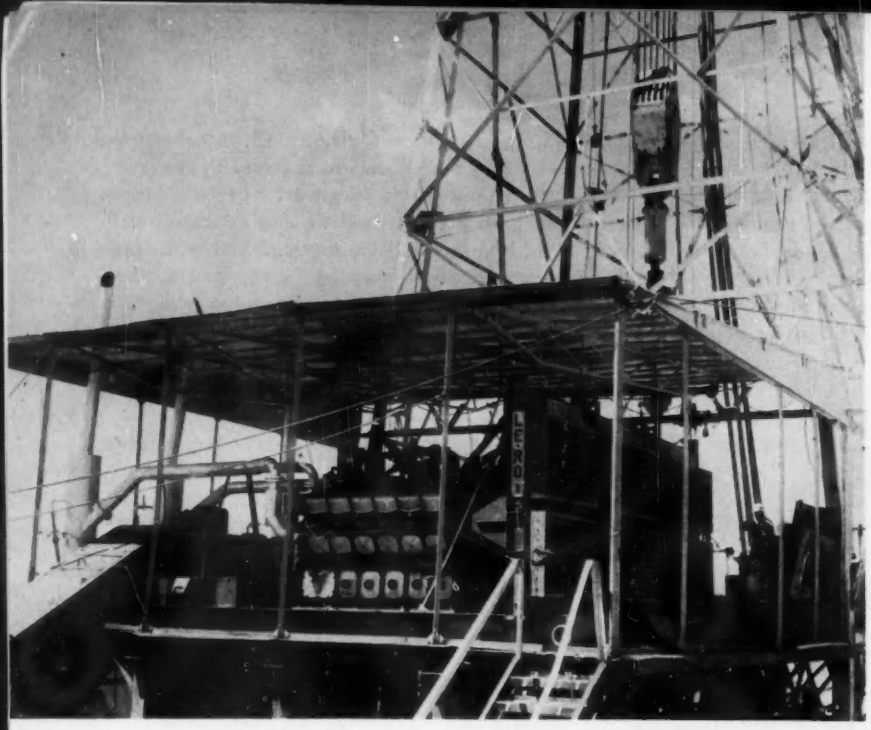
NEW engine or redesign? Sometimes it's hard to tell. The big thing is the engine's performance and its suitability to do the job for which it was designed. The National Supply Company points to the redesign, during the past year, of its Model 40 line of Superior engines for diesel-electric locomotive service. This redesign follows the company's policy of building better engines on the firm foundation of service experience with similar models.

These are 4-cycle engines, 8½-in bore by 10½-in stroke, running at 1100 rpm. They are rated 675 and 900 horsepower, gross, respectively, in the 6- and 8-cyl turbocharged sizes. These ratings are with a conservative bmep of 136 psi.

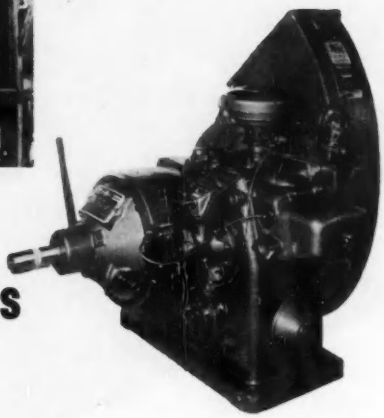
Characteristic features of the Superior engines, such as forced cooling of pistons, individual fuel pumps, full cooling of vital engine parts, and particularly, sturdy construction, have been retained. One major improvement consists of changing from four head valves to two. This simplifies rocker arm construction and permits valve parts to be shaped for more effective turbulence and combustion. Means are also provided to insure creeping valve rotation.

A feature in the drive is the provision of a pre-stressed cylindrical rubber coupling between the crankshaft and the main generator armature. This is a distinct deviation from general American practice. This coupling permits elimination of a vibration damper and allows the auxiliary drive details to be moved to the power takeoff end of the engine.

It is interesting to note that over 125 of these engines are now under construction in Holland and France.



"If you don't pump it today, you won't pump it tomorrow." This philosophy in the oil fields makes long, trouble-free service a basic engine requirement. Le Roi's L-4000 was designed with this and other service requirements in mind. This same philosophy extends to the rugged little A114 pumping engine below.



Le Roi's Natural Gas and LPG Engines

TWO new Le Roi engines are discussed to illustrate two points. First is the compact V-12, 675-hp L-4000 unit, that is a slightly larger version of the 600-hp L-3460 engine. While both engines are similar in construction, with many of the same features, the higher horsepower unit was built to meet a demand for increased power in the petroleum, cotton, municipal, and industrial fields. Power demands in all fields are increasing and in many areas, engines that can burn natural gas, the LPG's, or even gasoline are needed.

The vee-type configuration allows a lot of heavy-duty power to be packed into a small space. It also provides for a short stiff crankshaft and an inherently rigid engine. This is a big factor in maintaining alignment of the engine parts, particularly when the unit is skid-mounted and moved from place to place. Having spark ignition, either magneto or distributor, and several arrangements for fuel induction, the engine can burn the most economical of the fuels mentioned, as circumstances dictate.

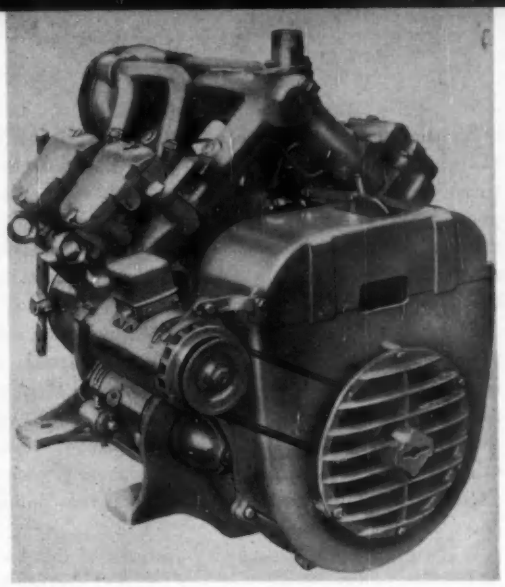
The second engine, the Model A114, was designed with a different set of considerations in mind. Its specific purpose is to meet the requirements of oil well pumping where horsepower requirements are modest. The engine must run continuously at a constant speed in all weather and with very little attention. It has shown an ability to run for two weeks at a time without an inspection.

A single horizontal cylinder, 5¼-in by 5¼-in, produces 13.6 horsepower at 1000 rpm. Two extra-large flywheels provide generous WR^2 values for smooth constant-speed pumping even with unbalanced loads. It incorporates all of the features of much larger engines such as a wet-type liner, precision connecting rod and main bearings, valve-in-head construction with Le Roi's guided valve mechanism, and full pressure lubrication.

Since natural gas is frequently available at the well head at no cost, this is the fuel normally burned. A magneto supplies ignition. The engine can also be equipped for LPG fuels. An interesting patented "vaporizing-condensing" cooling system is used. Makeup water is seldom required as the system is sealed. Apparently this is a form of high-temperature cooling since it is claimed that the engine runs at uniform temperature regardless of extreme ambient temperatures. This is said to prevent crankcase condensation, oil sludging, and acid formation.

Other features designed to fit this engine to its purpose include a simple means of checking the oil and water level without engine shutdown. A generous supply of oil in the base eliminates the possibility of dangerous low oil levels and permits long intervals between changes. Grease fittings, belts, or other accessories, were eliminated to cut chances of failure and minimize inspection.

Hallet Adds New Model



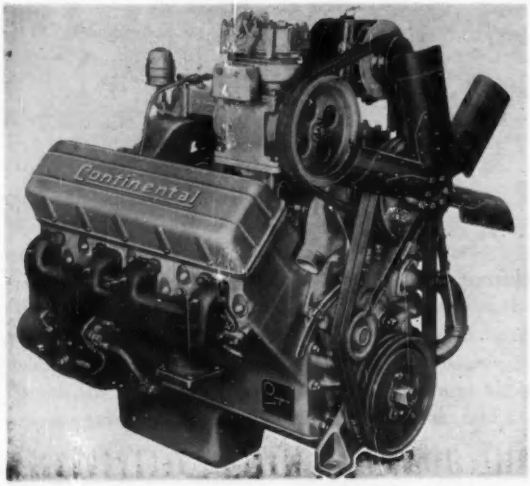
Hallett's WC-4 features operational flexibility and a high degree of parts interchangeability with the rest of the line.

HALLETT wants to have a whole family of engines in the low horsepower range. It would seem that even in this bracket the shape of the horsepower demand curve is upward. To meet the need, they came out with their Model WC4, a small and light vee-type unit. Maybe the horsepower requirements are up, but the limiting size and weight factors do not grow proportionately.

Lightweight features of other Hallett engines were utilized for as many components of this engine as possible. Crankcase, pistons, camshaft housing, and rocker arm enclosures are all aluminum castings. Following out the "family" idea, parts for this engine have a maximum possible interchangeability with those of their other engines. The vee-type configuration holds the overall dimensions as low as possible.

This little 4-cycle engine produces 28 bhp at 1800 rpm. The four cylinders have a 3½-in bore and a 3¾-in stroke. A low-friction feature of the engine is the use of Timkin taper roller main bearings. Rod bearings are conventional, being of the copper-lead precision type. Cylinders are individually cast of gray iron and include the cylinder head and water jacket as a single unit. A complete low-pressure "deluge" oil system is employed.

Small engines must fit the needs and they are many. Thus many types of power takeoff arrangements, cooling systems, and accessory items have been worked out for stationary, marine, or electric plant service. Another example of operational flexibility is found in the engine's fuel specifications. They list fuels with API gravities between 26 and 45. This includes the diesel fuels, stove oils, kerosene (all grades), JP-4 jet engine fuel, or similar products. The cetane limit is 30 or better.



Continental's chunky V-8 delivers 182 hp while turning at 2800. The compactness afforded by the vee design make the engine suitable for applications where space and weight mean a lot.

Continental Adds to its Family

HIGH power-to-weight ratio and unusual compactness are features of Continental Motors Corporation's new and advanced "family" of V-8 engines. The diesel Model VD8603 delivers 182 hp at 2800 rpm. Bore and stroke are 4½-in by 4¼-in; torque at 1200 rpm—468 lb ft. It was designed specifically for a wide range of transportation, marine, and industrial applications, and built for long life under sustained high-speed operation.

Shorter and narrower than many conventional V-8's of comparable output, these engines demonstrate the trend toward smaller, lighter units with higher horsepowers to improve the diesel's competitive position with respect to other forms of power. Attaining this goal means using all the time-tested techniques combined with the latest in technology and materials.

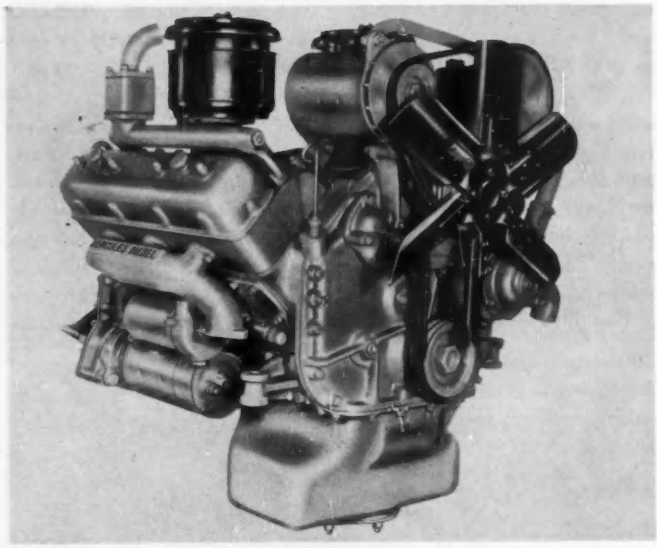
To attain rigidity and to insure continued alignment, the crankcase of high-quality chrome-molybdenum alloy iron is cast integrally with the blocks. Also it is deep, extending well below the shaft centerline for added strength. Full-length water jackets practically eliminate cylinder distortion. In fact, the whole cooling system is engineered to direct water flow to the various points in order of their urgency.

While there are a great many features of this engine that might be mentioned, perhaps some of the less conventional techniques and use of materials would be of major interest here. For example, cylinder heads are held in place by alloy steel cap screws rather than the conventional studs and bolts. Main bearing caps are of a bridge design secured on each side by two cap screws which are in line with the long axis of the cap rather than side-by-side as is so often the case.

The caps are of copper-chrome alloy iron in contrast to the chrome-molybdenum alloy iron of the heads and crankcase block. Both the main and connecting rod bearings are of the precision type and consist of steel backs on which a pure copper and nickel powder are sintered to form a matrix. Into this an overlay of corrosion-resistant high lead-base babbitt is cast. Pistons of aluminum alloy are tin-plated to prevent scuffing. Top rings are chrome-plated for long life.

Since this is to be a high-speed heavy-duty engine, balance received attention. Right from the counterweighted and balanced crankshaft to the closely matched piston, every effort was made to insure smoothness at all speeds.

Hercules has a New V-8 Engine



Tipping the scales at just a shade over 8 lb per hp, the DIX-V8 is sure to find wide application where space and weight are important factors.

HERCULES Motors Corporation has gone a long way in reducing engine size and weight in relation to horsepower in many of their engines. Their new Model DIX-V8-402, developed for heavy-duty high-speed service, carries this a step further. Like all the Hercules engines, this is a 4-cycle unit featuring the characteristic Hercules turbulence chamber-type of combustion system.

This is an 8-cyl, 90-deg vee-engine with a 4-in bore and stroke. This 402-cu in displacement produces a 160-hp rating. A torque of 310 lb ft is produced at 1800 rpm. The fuel injection system, featuring an en-bloc type pump and pintle nozzles, has a mechanical-type governor with a 400-3000 rpm range.

This is a small engine for its horsepower. Fan-to-flywheel measures 38 13/16-in, while the width is only 32⅛-in. In addition, overall height is 37⅞-in. The weight is a shade over 8 lb per hp figuring the engine with fan, electrical equipment, and clutch housing—or a total of 1300 lb.

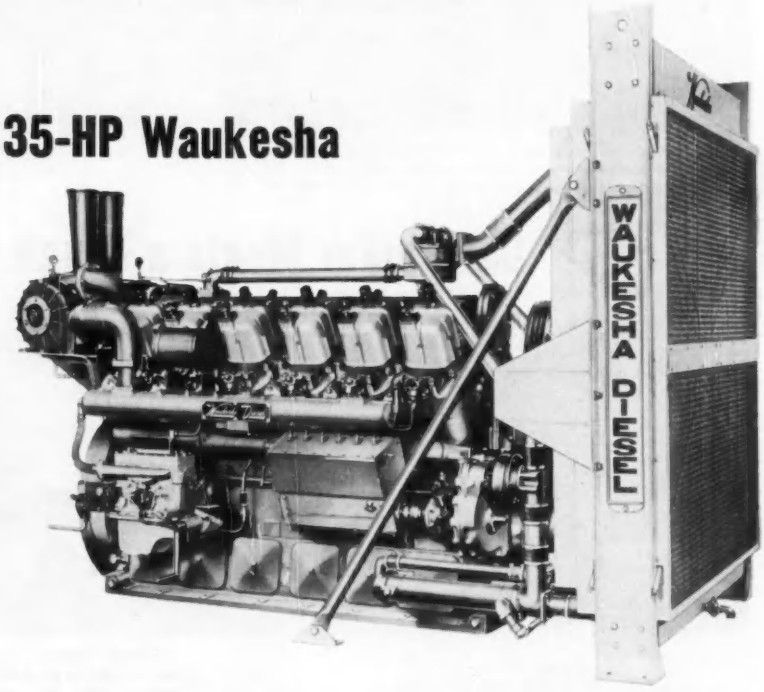
All of the vee-type engines lend themselves to a short, rigid block construction and this one is no exception. The crankshaft is a drop forging of special alloy steel

with journal surfaces hardened by the *TOCCO* induction hardening process. The five main bearings are high-lead bronze, steel-backed shells. Connecting rods are drop forged of nickel-chrome-molybdenum steel, after which they are heat treated. Also, rifle-drilling provides pressure lubrication of the piston pin.

The piston pin is full-floating in heat-treated aluminum alloy pistons that have three compression and two oil control rings. There is one cylinder head per bank of four cylinders and all the included valve and injector mechanism is enclosed in a pressed steel valve cover. A hardened cast iron camshaft of special alloy is used for each cylinder bank. These also have five bearings of the precision type, with a babbitt lining on steel shells.

Oil pan capacity is 12 qt and the oil is pressure-fed to all major moving parts. A screen and an efficient filter help to keep the oil in good condition. Cooling has received major attention. Two centrifugal pumps of ample capacity supply the coolant and proper temperatures are maintained by a thermostat and bypass arrangement. Typical of many maintenance-saving features, the water pumps have positive, self-adjusting seals.

Powerful New 1135-HP Waukesha



Trends toward higher horsepower demands are reflected in Waukesha's latest. Its Model VLR, rated pany's horsepower range at top end. pany's Horsepower range at top end.

WAUKESHA Motor Company's answer to the demand for stepped up horsepower in all markets using heavy-duty internal combustion engines is the new Model VLR series 12-cyl power units, available as a turbosupercharged diesel, a normal diesel, or built for use with propane-butane or natural gas fuel. This again illustrates the upward trend of horsepower demands and the fact that engines are not only being built to satisfy the demand, but to do so burning the most economical fuels available at the site. This cosmopolitan appetite for fuels can be a major factor in the economics of operation.

This powerful new V-12 diesel is a high compression, overhead valve, 60-deg vee, 4-cycle engine, with 8½-in bore and stroke, giving a 5788-cu in displacement. Operating with twin turbochargers and radiator, fan, and air cleaners, it develops approximately 1100 hp at the recommended maximum of 1200 rpm. Bare engine rating at the same speed is 1135 hp. Ratings of the normally aspirated diesel model as a complete power unit and a bare engine are 800 and 830 hp respectively.

Waukesha feels that this new high horsepower engine in many instances will eliminate entirely—to great advantage—the need for engine compounding. They point out that initial cost of the unit is less than that of two engines, each with half the horsepower, and the weight is less; transportation, moving, and installation are cheaper, easier, and faster. Maintenance time and cost are considered less, fuel consumption lower, operating attention less required, and actual output greater. Altogether, it was designed as an economy engine to be more efficient and more convenient from every standpoint, and to spell savings in horsepower dollars.

Field of applications of the new V-12 are seen to include all segments of the drilling industry, feeder pipelines, heavy compressor operation, municipal power plants, central generating plants, various offshore and workboat operations; in logging, quarrying, mining, shipping construction; and wherever there is the need for continuous heavy-duty operation requiring from 600 or 700 hp up to 1100 hp.

Power where and when you want it — with well-engineered, self-contained units to provide it....

Move it in, hook it up, then push the starter button. That's the concept that seems to be taking hold more and more. In this age of mobility, the flexibility of operation afforded by modern "power packages" offers a great many advantages. It's natural that this is being realized in many fields of application—in fact, new uses are continually popping up. High horsepower, low horsepower—there are units available to meet the new. And here are some of them.

Caterpillar Meets a Tough Requirement

Complete "Ground Support System" showing the trailer-mounted Cat D364 diesel-electric generating set followed by the eight trailers and the 4-circuit distribution cabinet. These combined will furnish ground support for four B-47 Stratojets.

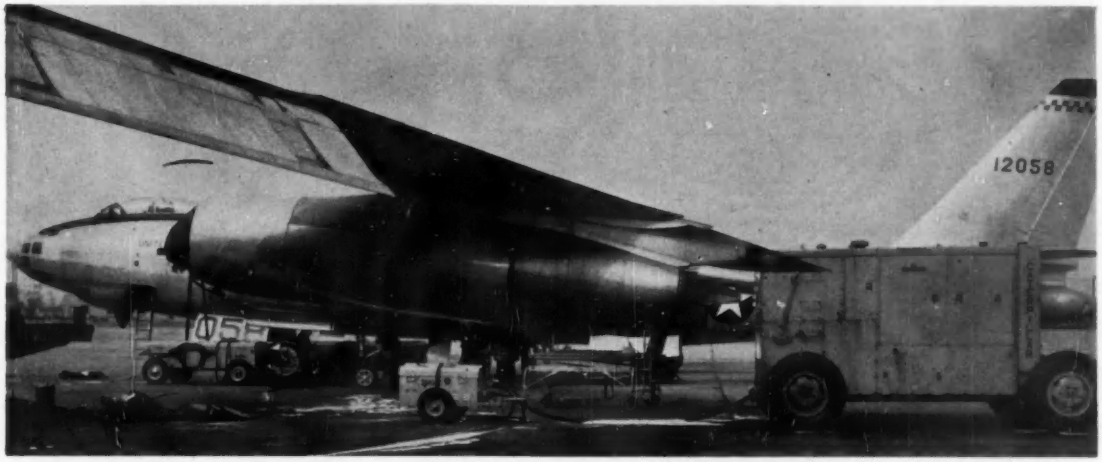
CATERPILLAR tractors and other earthmoving machinery have helped build ground facilities and runways for the Air Force for years. This supporting but nonetheless vital role may not be remembered in the excitement of seeing a supersonic jet roar off the runway. Now Cat diesels have a more intimate role and someone better not forget it or the plane won't even start.

Higher thrust jets; more power for starting. Also, precisely controlled and high quality power is necessary to support the installed electronic equipment during testing, service, and calibration. Caterpillar, cooperating with Marathon Electric Mfg. Corp. and Electric Service Engineering Co., produced a power system to meet the stringent ground power requirements of the Boeing B-47 Stratojet.

Marathon was the successful bidder on over 150 ground support systems, each of which will support four aircraft. A system comprises: (1) a complete 150-kw, 60-cycle, trailer-mounted diesel-electric set; (2) a trailer-mounted distribution system feeding four circuits from either the generator or commercial power; (3) four trailers with rectifiers and controls to supply DC for jet starting; (4) four trailers, each with a 60-cycle synchronous motor driving two 400-cycle generators for the electronic equipment supply; (5) cable assemblies for complete interconnection.

The prime mover is a D364, 5¾-in by 8-in, V-8 engine operating at 1200 rpm. The generator is a single-bearing 254/440-v, 3-phase, 60-cycle, 0.8 PF, 150-kw unit. Everything necessary for engine operation is in a weatherproof enclosure which with added equipment can be winterized down to minus 65°F.

The engine worked out very well in this application. The guiding specification for the generating set was MIL-

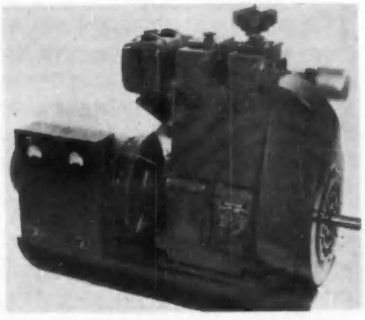


A familiar scene at U. S. Air Force Bases where the Stratojets are based. The ground support system provided power for jet starting plus special power for electronic instrument checks.

G-10327 which sets forth the required rpm (cycle) stability at steady states and rates of recovery with major load fluctuations. Stability and response had to be good because when only the 400-cycle maintenance power was required the load was light, but it could go immediately to full load when the jet engines were being started. Also, fast frequency response was needed under transient load conditions.

From the service point of view, the engine worked out well too. It's a popular engine type with parts and service available throughout the free world. Not only is it easy to service, but a great number of service personnel are familiar with the engine. Also, it is an important advantage in this application that the engine has the ability to burn undiluted JP-4 jet fuel without any adjustment being required.

Petter Introduces New Feature

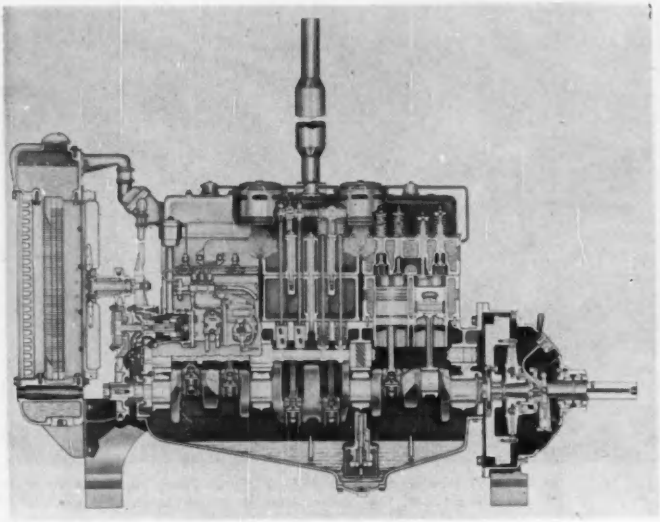


Versatility, compactness, light weight, diesel reliability—all apply to the Petter units.

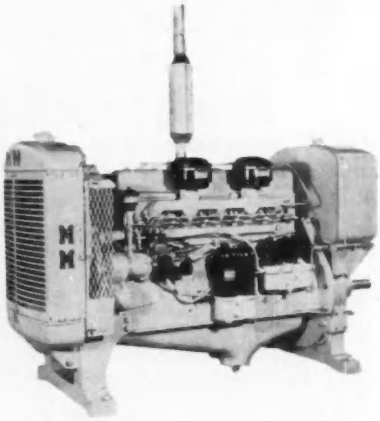
NEED a small power package? How do you want it cooled and what do you want to do with it? Small power plants have to be flexible to meet all the different questions to these answers. The Petter Diesel Engine Division of Brush Aboe, Inc., has a family of small engines with both air and water cooling arranged for just this sort of thing.

For example, the small Petter PAZ1 air-cooled engine, developing 3 hp at 1800 rpm continuously, can be obtained in a number of ways. One option is to include a No. 6 SAE housing for attachment of a number of types of standardized driven equipment, flange-mounted pumps, generators, etc. This feature extends to the other engines as well. A typical flange-mounted generator set with a 7½-kw generator driven by the Petter AVA2 air-cooled engine is shown.

Other complete units are built with the whole package mounted on a skid sub-base. Water-cooled units have integral radiator and fan assemblies, while air-cooled units have a flywheel-fan combination.



Heavy-duty design is used throughout Minneapolis-Moline's new industrial power units. Two point suspension is achieved through use of a deep-skirted crankcase, heavy cast pan, and rigid flywheel housing.



Minneapolis-Molines Power Unit

IF you have something that you want to turn, you can get a unit such as Minneapolis-Moline's new industrial power unit. The standard arrangement provides for a power takeoff incorporating a clutch. With this setup you can drive a wide variety of machinery through belting or shafting and get the benefits of reliable, economical diesel power.

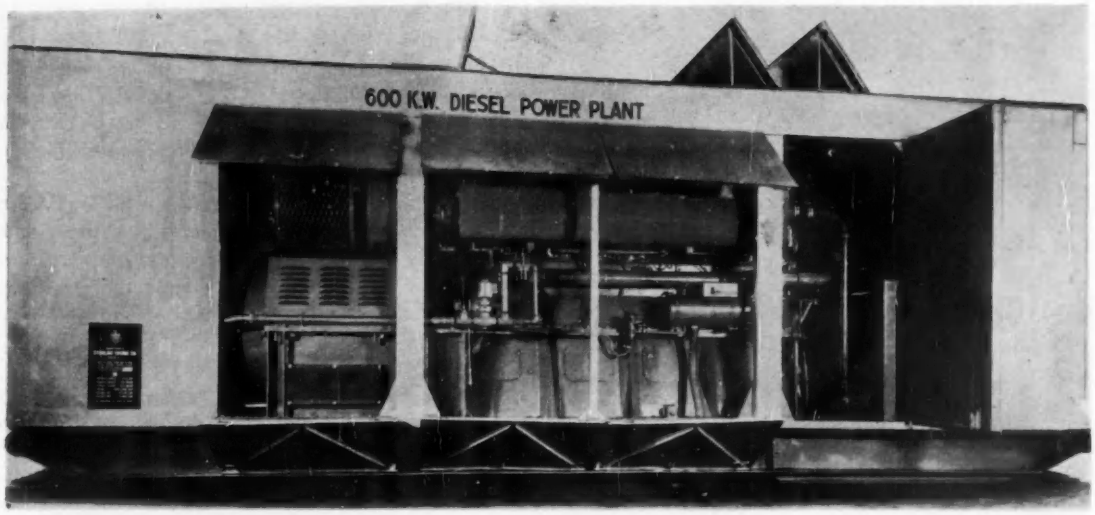
Demonstrating the versatility of MM's new D425-6 engine, it is also optional power for their GB tractor, in which case it is fitted with special tractor drive components. It is easy to see where this would be appealing to a farmer; he could have the same type power plant in his tractor that he used for other farm power requirements. Standardization breeds familiarity—and parts interchangeability.

Since the engine was first put to work, field experience and further laboratory work have stepped up its output to 72 bare-engine horsepower. It is a 6-cyl engine with a 4½-in bore and 5-in stroke. Heavy-duty design features include a rigid crankcase, extending well below the crankcase centerline; three cylinder blocks, each for a pair of cylinders; a heavy cast base pan; and, a wide rigid flywheel housing flange.

A Lanova energy cell type of combustion system is used. These cells have the effect of lowering peak pressures and utilizing the gas pressures throughout the stroke for greater effectiveness. Piston temperatures are lower. The cleanliness of the exhaust and the smooth operation are evidence of good combustion efficiency. An American Bosch single-plunger pump, delivering the fuel to self-cleaning pintle nozzles, is used.

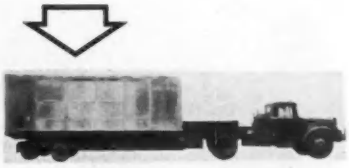
Filtration received a lot of attention. Intake air is cleaned in two oil-bath type filters. Positive and protected crankcase ventilation is also provided. Dual full-flow lube oil filters keep the oil in good condition. Incidentally, bearing lubrication has been improved and bearing unit pressures reduced by increasing the sizes of both the main and connecting rod bearings. The fuel is filtered in three stages, two being under a gravity head and the third under pump pressure.

Although the engines and replacement parts are high-production items, the design of the overall unit is such that many variation are available to meet exact customer requirements. Also, there are provisions for the installation of special or accessory equipment such as manifold heaters or pressure primers for cold weather starting.



Side panel design provides complete accessibility and at the same time affords overhead shelter and handy servicing platforms. Cooling system is at right in housing while auxiliary equipment, including the auxiliary engine, is in left end.

Sterlings 600-KW Power Package



COMMERCIAL availability of products often comes about through the development work necessary to meet the rigid requirements of the Military. For example, the Bureau of Yards and Docks, U. S. Navy, wanted a generator set that would be portable and transportable by a standard 25-ton Army trailer, railroad car, on shipboard, or by large cargo plane.

Its weight should be not more than approximately 45,000 lb, its length not over 24 ft, width within 115-in, and the unit not over 104-in high. It must be completely self-contained and have electrical equipment producing 2400/4160 volts, with necessary changeover straps for each voltage. These are a few of the preliminary requirements.

Sterling Engine Company went to work using their 8-cyl, 8-in by 9-in, turbocharged engine as a basis for the design. This engine is rated 1000 hp at 1200 rpm. The end result was a completely enclosed unit capable of producing 600 kw at the bus, plus a 10% overload. It weighed exactly 45,500 lb and was within the specified dimensional limits.

To give an idea of the completeness of this generator set, consider what is included. First, there is the engine and all its equipment. There is radiator cooling for both jacket water and lube oil. Main electrical equipment includes the 3-phase, 60-cycle, 600-kw (0.8 PF) generator, its exciter and switchgear. Also, there is a cable reel and cable for connecting the electrical output as well as a grounding system for the whole unit.

A 6-kw auxiliary diesel generator set provides power for lighting and general electrical service. Typical use of this power is for the motor-driven air compressor that fills the starting air receiver. Also, there is an electrically operated unit heater. A 12-v battery system (450-amp discharge capacity for 6 hr) and charging equipment are also included.

For dead-plant starting there is a fuel oil-fired preheating system and motor-driven lube oil priming pump. Also, fuel can be hand pumped. All of this equipment is arranged for easy accessibility in a weather-resistant housing on a rigid base.

This base was built with the service requirements in mind. It is arranged for 3-point suspension and uses leveling devices for uneven terrain. It also has provisions for lifting gear. Tanks in the base provide storage for fuel and lube oil. This again emphasizes the "self-contained" features that are being sought in these power packages. In addition to those supplied to the Navy, these units are being produced commercially in a range of sizes from 250 to 600-kw.

Alco's Standard Package for Drilling Rigs

AFTER two years of development, the American Locomotive Company introduced a diesel-electric plant designed as an integral package furnishing all power requirements for offshore or land drilling. They claim to be the first manufacturer to assume responsibility for design and coordination of a complete plant of this type for oil well drilling.

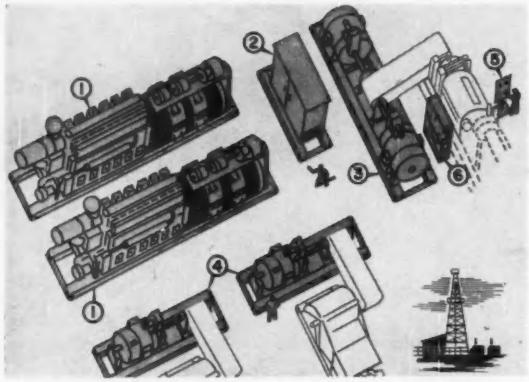
This new "standard package" power plant is priced to sell at about the cost of a conventional power rig. In contrast, the relatively few diesel-electric power plants now used for oil drilling have been custom designed, and have been comparatively high in price. Alco reports keen interest in this new development.

The "package" plant consists of eight skid-mounted components with power generated by two diesel-generator sets. Each set consists of a diesel engine, two main generators, and an auxiliary generator for extra power needs. Two motors, mounted on one skid, drive the drawworks which raises and lowers the drilling bit and drill pipe. Two pump motors circulate the drilling mud. A main control cabinet mounted in front of the two diesel-generator sets distributes the power as required. A driller's control cabinet and control stand complete the package.

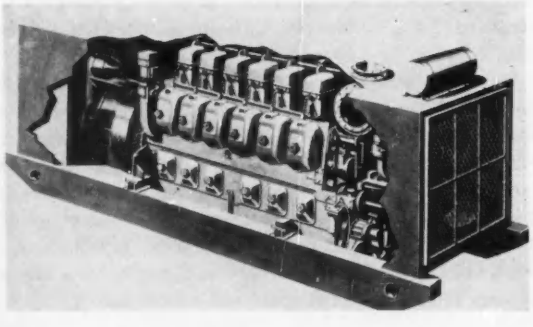
Operational flexibility permits the driller to run the drawworks, pumps, rotary table, or other drilling apparatus, singly or in combination. The standard package is so designed that a third diesel-generator set for extra power or other modifications can be made through simple additions to the control panel. No matter what modifications are made, the control system is so simple that a driller can operate the rig with pushbutton ease.

This plant is perhaps representative of Alco's overlapping fields of interest. For many years they have produced engines for the pipelines and other portions of the petroleum industry. They also produce heat transfer equipment for these applications. They now produce valve, blocks, and wellhead equipment. Then as a major locomotive builder, they had to produce the compact self-contained power plant that is the diesel-electric locomotive. Phases of each activity have been combined to produce these units.

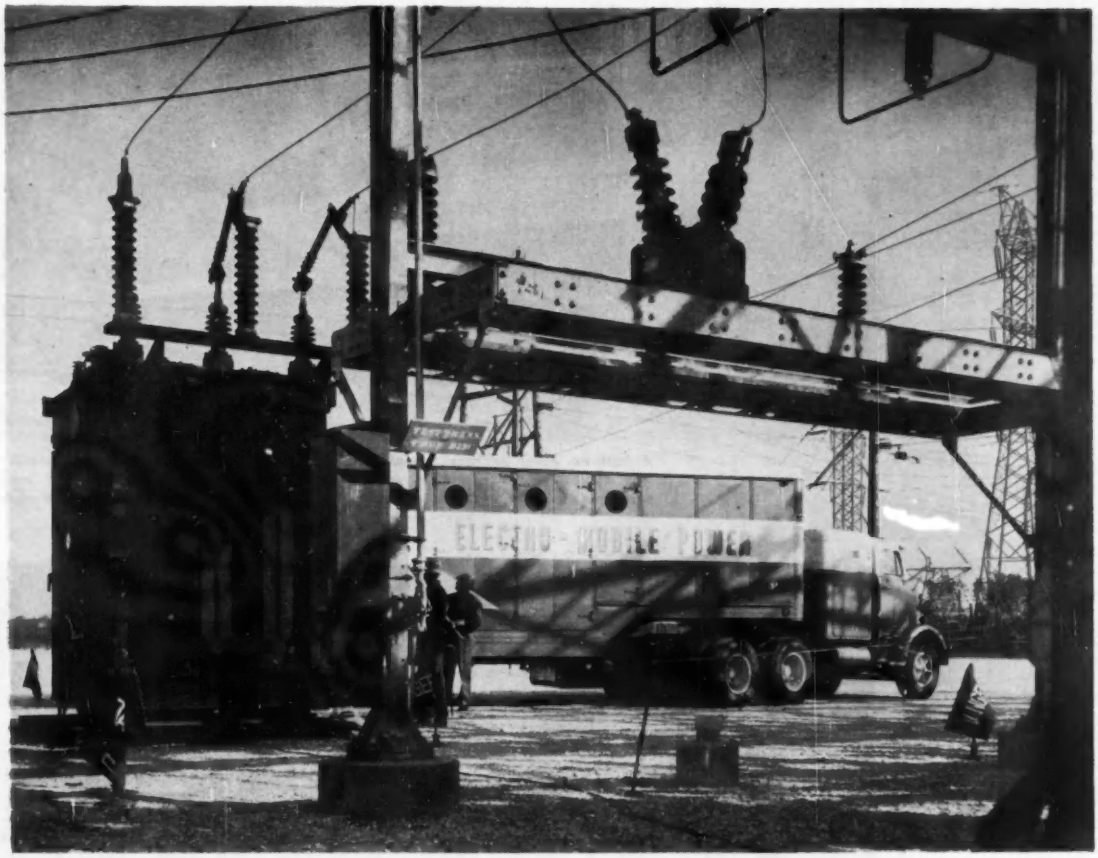
As far as the diesel-generator sets go, Alco also has a line of three portable power packages, self-contained and skid mounted. Using 6-, 12-, and 16-cyl versions of their 9-in by 10½-in engine turning 900 rpm, they can produce units rated 565, 976, and 1300 kw, or 800, 1380, and 1840 hp respectively. The engineering is such that oil pipeline pumps, compressors, water pumps, power takeoffs, other mechanical arrangements can be substituted for the electrical equipment.



Artist's conception of Alco's diesel-electric drilling rig power plant showing: (1) engine-generator sets, one engine, two main generators and an auxiliary generator each; (2) main control panel; (3) drawworks motors; (4) mud pump motors; (5) driller's control stand and; (6) driller's control cabinet.



Alco's standard portable power packages offered in three sizes, use 6-, 12-, and 16-cyl versions of their 9½-in by 10-in engine.



Over-the-road version of EMD's mobile power unit has a 500-kw capacity. It can be rolled into a sub-station, connected by the use of "hot sticks" as is being done here, and be pumping power into the line in a matter of minutes. Units can be used singly or in parallel to provide ample power.

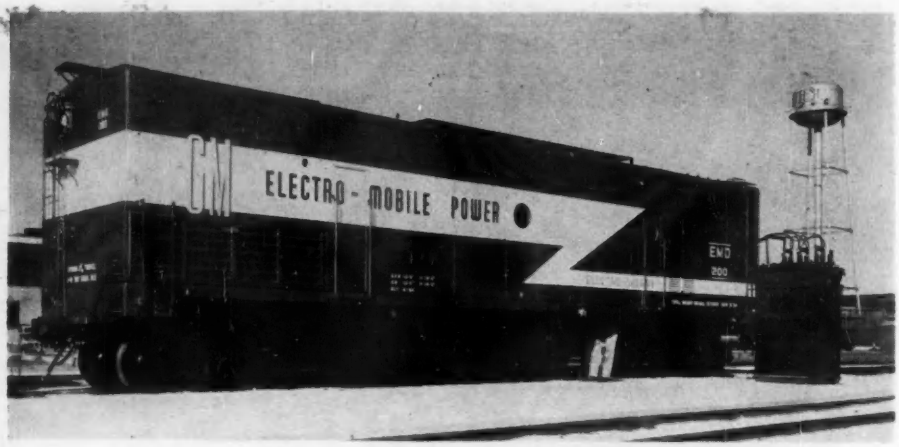
EMD's "Electro-Mobile" Power Units

A NEW tool to help electric utility companies meet public service problems in far outlying or "fringe" areas is contained in the new "Electro-Mobile Power Units" being built by Electro-Motive Division of General Motors.

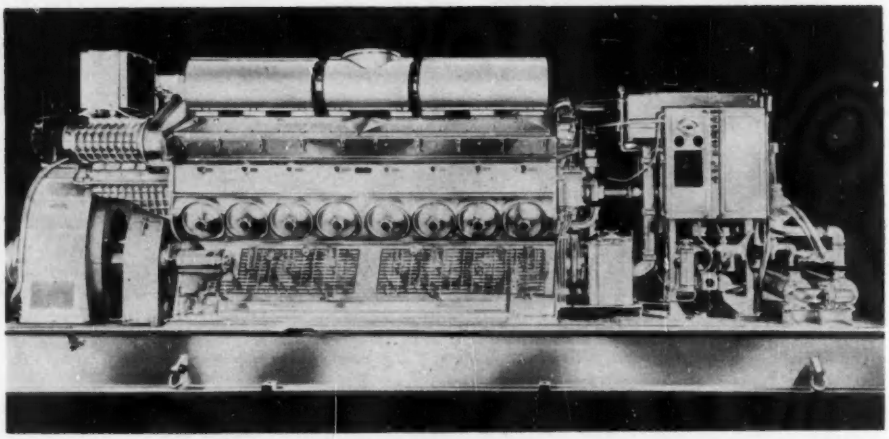
The new electric generating units were introduced to the electric utility industry, the armed forces, and the press during the month of October at special demonstrations conducted at Electro-Motive's La Grange, Ill., plant and at the Engineer Research and Development Laboratories of the U. S. Army Corps of Engineers at Fort Belvoir, Virginia.

The equipment consists of three versions of electric generating plants developed out of the experience of Electro-Motive in producing some 16,000 diesel-electric locomotives for North American railroads since 1934. Major components of the new generating plants either are identical with the major components of the General Motors locomotives or so similar that they can be put into immediate mass production alongside diesel locomotives at the La Grange plant.

One version of the plant is housed in a railroad car and built in capacities of 750 and 1000 kw. A highway version is housed in a specially designed highway semi-



A 1000-kw power package, completely self-contained and rail-mounted for mobility. Any number can be used in parallel to meet the load requirement. For semi-permanent installation the trucks are rolled out and the unit supported on pedestals.



Skid-mounted version of the 1000-kw power package. Components are essentially the same as those enclosed in the carbody of the rail-mounted unit above. In addition to this size, smaller units of 350-, 500-, and 750-kw capacity are also built.

trailer and made in 350-and 500-kw capacities. Portable plants on rigid steel platforms, easily put on skids and transported to any desired location, are manufactured in 350-, 500-, 750-, and 1000-kw sizes.

At the Fort Belvoir demonstration, Army, Navy, and Air Force officers were shown how fleets of the units could be quickly moved into a stricken area either by rail or highway, and sufficient electricity to restore vital services provided within a few hours. Unusual features of control were also demonstrated, such as starting and stopping a unit by radio control or merely by dialing a telephone.

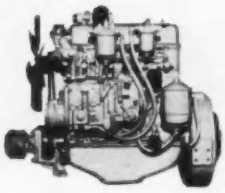
The mobile plants also have high potential for military use in temporary installations such as to provide power for the large mobile maintenance stations necessary for mechanized equipment used by an invading army, it was pointed out at the demonstration.

The units were not developed primarily for military use however, but rather as a tool with which electric power companies can meet difficult problems growing out of the increasing migration of population and industry from populous centers to far outlying territory. These consist largely of meeting unusual demands for power which either are so seasonal, so temporary, or so low in load factor, that it is not economic to extend either an original power line or a second line for protection.

Where was the diesel applied? Documenting last year's list of uses would fill a 5-ft bookshelf - and then some...

It's easy to generalize on where diesels were used last year. They went in wherever they offered an economic or operational advantage. Being more specific is difficult, not for any lack of applications but because there "just ain't room". So we picked out for elaboration three general categories of diesel usage—materials handling, pumping, and electrical power generation—because, taken in a liberal sense, they cover a broad segment of total diesel usage.

The broad field of "Materials Handling"



Buda's Spark-Proof Lift Truck

WHEN you think of materials handling you probably think of fork lift trucks. Palletizing, bulk movement—latest thing in handling. But in many places you can't use conventional fork lift trucks and this was a big stumbling block until diesels moved in.

The Buda Company, Division of Allis-Chalmers Mfg. Co., developed a series of special spark-proof diesel-powered fork lift trucks in 3000- and 4000-lb capacities for use in areas where conventional trucks are prohibited. Soon, all Buda models from 3000- through 7500-lb capacity will be included in this particular line.

Use of Buda's diesels in these trucks completely eliminates hazards due to possible electrical sparks from ignition equipment. Electrical equipment is completely eliminated. The engine is started by a hydraulic motor. Hydraulic energy for starting is taken from a hydraulic accumulator, filled, and kept at constant pressure by the truck's standard hydraulic pump.

Water-cooling maintains a low surface temperature on the exhaust manifold, normally the hottest external portion of the engine. Water coolant for this manifold is part of a standard engine cooling system. A water muffler is also used, eliminating the possibility of exhaust sparks. The muffler water is stored in a special reservoir. Engine backfire cannot occur since sufficient

compression to ignite the low-volatility fuel would not exist if a valve were stuck open.

As a further precaution, static-conductive tires are available to minimize electric sparks due to accumulation of static energy. Trucks may be provided with protective wood bumpers to prevent sparks and may also be provided with non-sparking metal forks.

Why is all this important? Simply that the non-sparking features plus the use of low-volatility, high-flash fuel—plus again the economy and stamina of diesel operation—make operation possible in places where it is normally taboo. Add to this the relatively non-toxic exhaust fumes when compared to those of gasoline engines in similar service, and you wind up with a unit that can operate in confined areas with safety.

This means the holds of ships, piers, warehouses, and other places where either ventilation and/or explosive hazards are a problem. It all means that the diesel is expanding the whole field of usage—and setting new standards—for this type of equipment.

International Drott Skid Shovels

International Drott "4-in-1" operating as a "bullclam". Apron portion of shovel actually opens about 10-in to allow material to boil into shovel as tractor moves.

The standard Skid shovel is preferred by many operators for excavating or loading out materials.

EARTHMOVING and movement of similar materials is certainly a form of materials handling. The tractor is the "Hallmark" of this type of handling equipment, perhaps because it is one of the most versatile and useful machines. Attachments are endless—dozer blades, straight and angled; side booms and winches; front-end loading gear—just to name a few.

Taking a specific case, a six-model line of International Drott Skid Shovels were designed for any heavy-duty front-end loader work in capacities from 7/8-cu yd to 3-cu yd sizes. The prime movers are International-Harvester's TD-6, TD-9, TD-14A, and TD-18A crawler tractors. A special "4-in-1" version based on the TD-6 or TD-9 was designed to handle a variety of small to medium earthmoving jobs.

A selector lever immediately converts this unit into a "bullclam" shovel, a bulldozer, a "skid shovel", or a clamshell. As a bullclam shovel, the "4-in-1" is ideal for smaller sanitary landfill work. With the clam completely open, it becomes a bulldozer. Depth of cut is regulated by forward or backward blade tilt.

In skid shovel position, the roll-back at ground level is the same as for the standard Skid Shovel. For loading out dirt, the "4-in-1" features both forward and bottom dump. For picking up stock-piled material, it is placed in clamshell position, the shovel dropped on the material, then closed hydraulically.

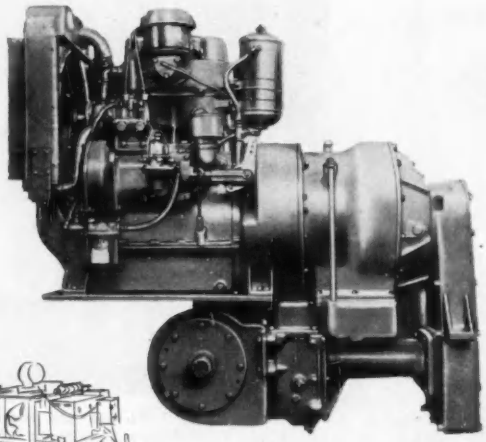
Exclusive skid shoe design transmits pry-out or digging forces into the ground rather than to the tractor. They serve as a pivot for the shovel's lever action principle. This permits a high ratio of digging force to unit weight. The smallest standard and "4-in-1" units have a pry-out force of nearly 8500 lb, with a unit weight of about 13,000 lb. This ratio of about 2 to 3 holds pretty well throughout all models.

Power for this pry-out force, essential for efficient handling of dirt, rock, coal, ore, slabs, pipes, etc., is obtained by reverse hydraulic action. For digging, hy-

draulic pressures act on the wide face (no piston rod) of the piston. Dump action is fast since less oil is needed to return the piston.

Actual wear or strain on the I-H tractor is minimized through an exclusive feature—the *Hydro Spring*. Part of the hydraulic system supplying oil to the lift sides of the main lift cylinders, it absorbs the terrific hydraulic shock loads encountered in front-end loaders that normally tend to displace oil from the lift cylinders. Through spring compression in the *Hydro-Spring*, more than two-thirds of the shock is cushioned. Oil is restored to the cylinders as the spring expands.

Materials handling of 20-ton chunks such as this shot rock for dam construction calls for large equipment.



Complete power train for the tiny locomotive includes a Model 17 Sheppard diesel, a torque converter, and final drive. Drawing (left) shows operators seat which folds.

Sheppard Powers GE Mine Locomotive

DIESELS are a natural for the rugged service required in all types of mining operations. This applies above ground in open-cut and strip mining, and up to now to a lesser extent in underground operations. But this field is going to grow.

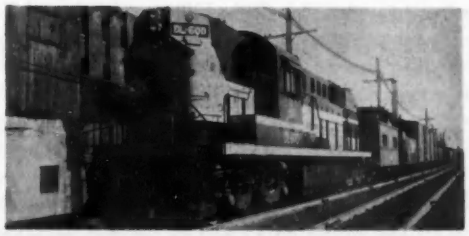
Take the new 1½-ton mine locomotive recently announced by General Electric. The power unit, which includes a torque converter drive, was developed by R. H. Sheppard Co. engineers to specifications calling for extremely compact design. It is approved for underground operation by the Bureau of Mines according to Schedule 24.

For economic reasons it was of primary importance to keep the overall physical size of the locomotive as small as possible without reducing its working capacity. This would permit the digging of smaller drifts and shafts to effect considerable savings in mining costs.

Being extremely compact in relation to its power output, the standard Model 17 Sheppard diesel lent itself ideally to these requirements. Starting with this 20-hp Sheppard engine, General Electric was able to develop a powerful but small locomotive measuring less than 4-ft long when in folded position for entering a mine shaft cage.

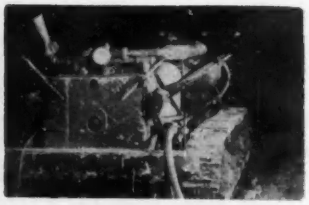
The greatest problem encountered in powering the GE locomotive was development of a suitable drive that would fit along with the diesel engine into such limited space. Sheppard engineers used a torque converter transmission with a working capacity four times greater than the engine output to assure smooth acceleration and haulage of heavy loads at efficient speeds.

The 20-hp Sheppard engine with this torque converter drive can start a 100-ton load from a dead standstill on level track. It develops equal power and speed operating in either direction, forward or reverse.



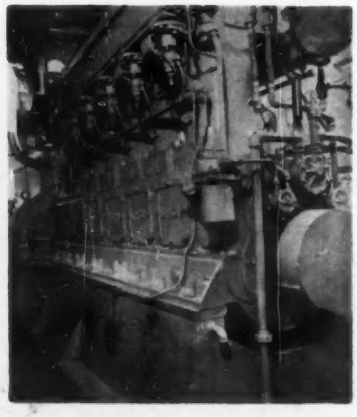
Alco's DL-600, developed last year, comes under heading of long distance, high-tonnage materials handling equipment.

Euclid's bid for a bigger share of materials handling came when it introduced its GM-powered crawler, shown helping load a scraper.



Standard wheeled and track-laying equipment adds economy and flexibility to mining. Scrubber on driller (right) and front-end loader (left) cleans exhaust gases.

Union Powers a Floating Crane



Two Union diesels like the one above power this 100-ton Navy crane shown lifting 125-ton as part of builder's tests.

ANYONE who has ever been faced with the task of unloading deck loads beyond the capacity of the ship's gear, or handling caissons or bridge steel in the middle of a river, will sure indorse the floating crane as a materials handler. This 100-tonner built by Todd for the Navy shows how broad the field of materials handling can be. And being powered by Union diesels, it shows extreme range of engine sizes used in this service.

The Union Diesel Engine Company supplied two 125-kw diesel generating sets for each of two cranes built in Todd's Seattle yard. These cranes, incorporating all of the Navy's savvy gained through experience, are considered by many to be among the finest of the type ever produced. This, of course, reflects favorably on the motive power.

Union points to two interesting features of the engines supplied for this service. The first concerns the fuel injection pumps which, as can be seen, are inverted. Heretofore, such installations have tended to leak too badly in this unorthodox position. In this case, the standard pumps were made by Bendix-Scintilla but special modifications were used to permit their inverted operation without excessive leakage. Union engineered, built, and installed special drives.

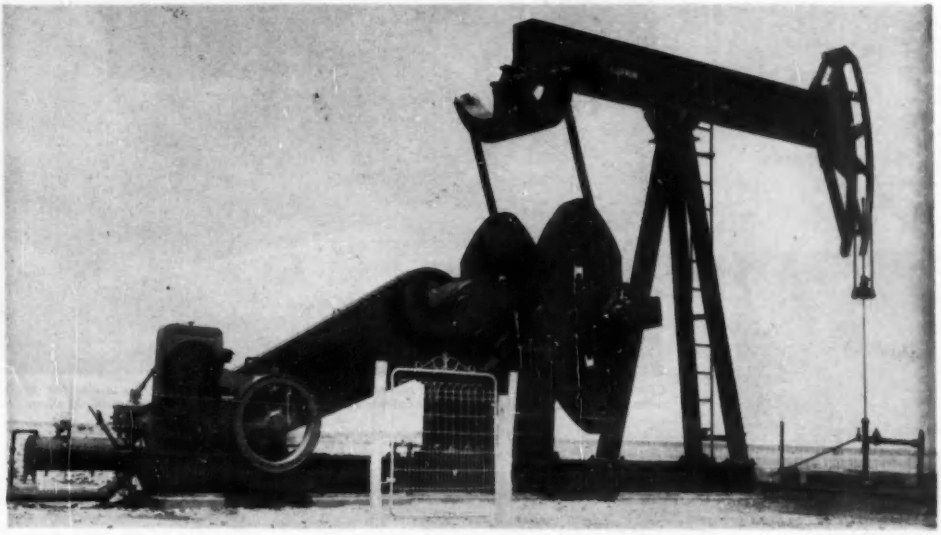
These drives or tappet assemblies incorporated adequate drainage facilities as well as pieces comparable to umbrellas. This keeps the rain of lubricating oil out

of the way and eliminates the leakage problem. This accomplishment of inverted operation was important as it contributed to the simple, compact design of the engine.

The second feature concerns the governor drive and is a major factor in smooth, even governor control of the engine. The drive's design is based on two generally accepted but seldom followed precepts. First, the governor should be driven from the flywheel end of the engine because the least cyclic variations occur at this location. Secondly, the drive should be solely for the governor and independent of other auxiliary drives. Uneven loading of auxiliary drives (for cams, pumps, etc.) may transfer impulses to the governor drive and affect the smoothness of governor operation.

Union feels that these are two important factors contributing to the overall success of these engine models —as applied in these cranes and other applications.

Now for a look at "Pumping"



Day-in and day-out service with only an infrequent "look-see" is routine for oil field pumping engines.

Lufkin's Engines for the Oil Industry

A NEED often dictates a design. Around the oil industry there is a lot of pumping and compressing to be done. And the needs are somewhat peculiar to the industry. Long periods of unattended operation with continuity of service a big factor, exposure to the elements, and ability to use the fuel common to the majority of anticipated locations, are typical of the requirements.

Engines built by the Lufkin Foundry and Machine Company, Lufkin, Texas, show the dictates of these needs. They are manufactured in two sizes of 2-cyl, 2-cycle, horizontal, heavy-duty natural gas engines. They have many applications such as pipe line pumping, generation, centrifugal pumping, and oil well pumping where a heavy-duty, continuous service, long-life engine is desired.

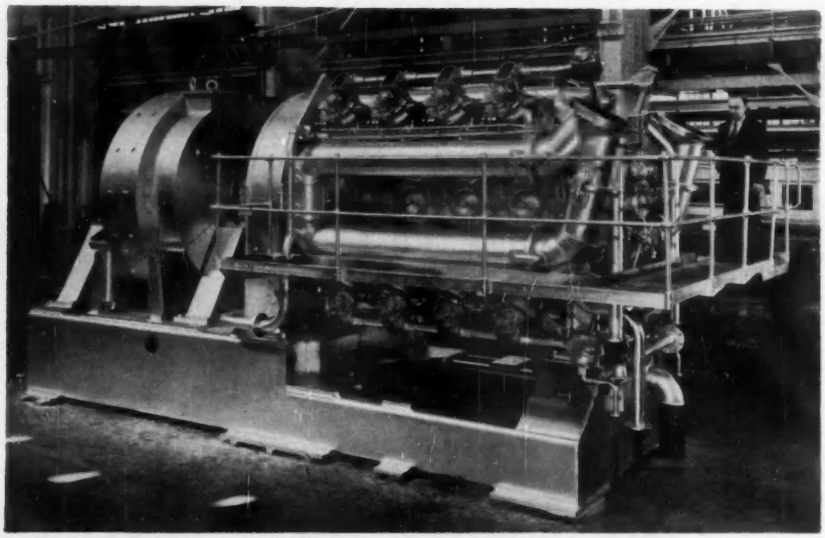
The Model H-333 engine has a 5½-in bore by 7-in stroke and a speed range of 350 to 750 rpm. The continuous duty rating is 20 hp at 425 rpm and 30 hp at 650 rpm. The Lufkin Model H-795 engine has a 7½-in bore by 9-in stroke with a speed range of 300 to 600 rpm. This engine is rated for continuous duty at 45 hp at 400 rpm and 65 hp at 600 rpm.

Both of these engines are designed with cross head construction and two cylinders for greater smoothness. Full pressure lubrication is provided and the cylinder force-feed lubricator is automatically filled from the sump. Cooling of these engines is performed by pressure-

sealed thermosyphon cooling that provides uniform high water jacket temperatures irrespective of load conditions.

The engines are sold with all the equipment necessary to go right into action. Options in the equipment for starting and governing help to fit the engine to the particular need. The normal arrangement provides for power take-off through a Twin Disc clutch. Options, here, provide for direct connection through flexible coupling or by mounting a sheave right on the end of the crankshaft.

Whatever the arrangement or the optional equipment chosen, the engine is completely weather-tight for unprotected operation. These units, using a high-tension rotary magneto, are built only for the use of natural gas or the butane-propane fuels.



Cleveland's "X" engine was first installed as a vertical unit, generating power for aluminum ore reduction. (left) Horizontal mounting is used for pipeline pumping applications.

Cleveland Diesel's X-type Engine for Pipeline

DURING the past year a new X-type natural gas engine was made available for pipeline applications. This is the 16-cyl, spark-ignited, 2-cycle, loop-scavenged Model 358 engine developed by Cleveland Diesel Engine Division of General Motors. Its first use was for an industrial application. Its nominal rating is 3300 hp but it has been operated at a 3500-hp output.

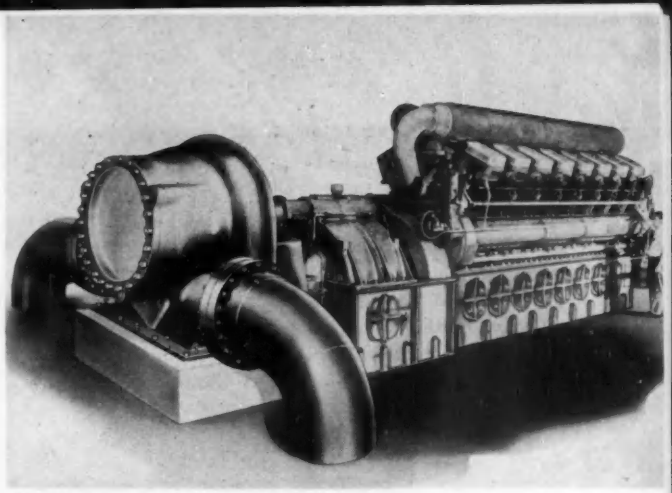
For the past two years, 41 of the GM Model 358 engines, arranged vertically, have operated at the Reynolds Metals Company plant near Corpus Christi, Texas. Cleveland Diesel points to the fact that during this period the engines have operated for 95% of the total hours available. Also, they have operated at a high load factor (dictated by potline demands), producing 90% of the total power available from the installed generating capacity. Total power is based on 41 engines running continuously.

During this 2-yr period, according to Cleveland Diesel, the average load per engine was maintained at 95% of its total generator kw capacity. Moreover, fewer than 5% of the total operational hours during this period were used for maintenance.

Cleveland Diesel is now undertaking to serve the petroleum and pipeline industries from a background of manufacturing for marine, utility, and industrial applications. The new horizontal version of the Model 358 is being built with engine-driven scavenging compressor and attached engine accessories. It can be direct-connected to standard speed increasers or reduction gears and will drive either centrifugal compressors or petroleum pumps.

Applied to pipeline installations, this engine in combination with speed increaser and centrifugal compressor would be a high-powered, compact, and rugged unit. In view of its compact design and direct-driven attached accessories, a lot of pump-station piping would be eliminated and also crane requirements, building size, and building costs would all be materially reduced.

Nordberg's Supairthermal Gas Engine



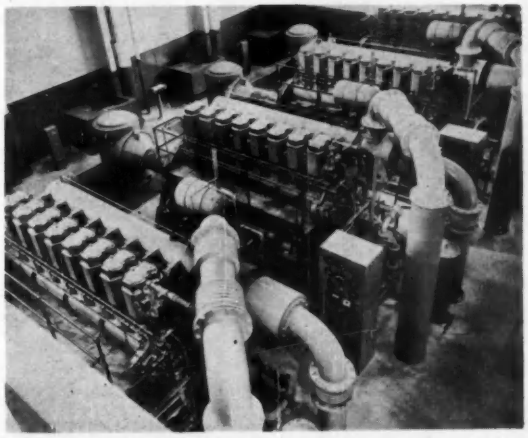
Nordberg's new vee-type spark-ignition Supairthermal engine with built-in speed increasing gear for centrifugal gas compressor drive.

SUPAIRTHERMALS are showing up in increasing quantities in a number of different services. Until this past year, all of these were either diesel or dual-fuel units. Then Nordberg introduced this high-power, heavy-duty engine as a natural gas engine with spark ignition. One configuration is a vee-type unit having a built-in speed increasing gear for centrifugal gas compressor drive. This combination is aimed directly at the gas pipeline industry and was designed with the idea of producing very low overall gas transportation costs. For compactness and to insure proper alignment of the speed increaser, it is mounted on the bedplate extension of the engine.

The 4-cycle Supairthermal vee-type engines are built in 12- and 16-cyl models having 13-in bores and 16½-in strokes. This produces a horsepower range from 2400 to 5000 bhp. The natural gas engines incorporate the exclusive Supairthermal principle featuring variable inlet valve timing. The effect is to permit a variable compression stroke while still retaining the full expansion stroke.

Net results of this Supairthermal system have shown the ability to operate these engines at very high bmep's without appreciable increase in the thermal loading of the engine. Also, Nordberg pegs the thermal efficiency of these gas engines as being in excess of 40%.

Enterprise pumps storm water



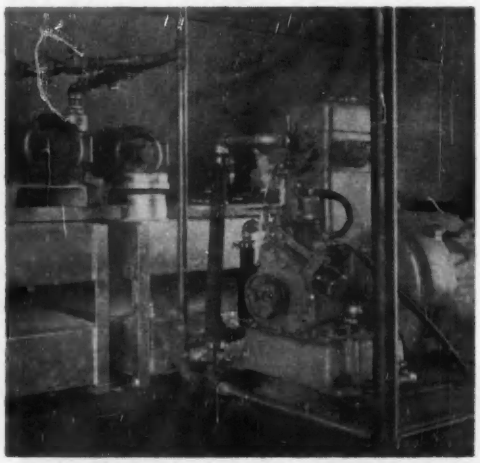
Each Enterprise engine drives a 113,000-gpm pump through right-angle vertical gears. Automatic controls actuate units as required.

OUT in California, the City of Oakland has instituted a major drainage system to control storm water. Control center of the comprehensive project is the 34th Street Storm Water Pumping Station. Powering this plant are four Enterprise DSG-318 8-cyl turbocharged engines each rated 1200-bhp at 560 rpm. This is typical of how diesels are being used by municipalities for pumping applications. It might be storm water as in this case, or perhaps the potable water supply or even sewage disposal pumping.

In this installation, each engine drives a mixed flow pump through right-angle gears. Each pump has a capacity of 113,000 gpm, and all four pump units are automatically controlled. An integration of electric and pneumatic controls match the plant output to the total pumping requirements. An initial engine is started and will carry the pumping load until it exceeds the unit's capacity. At this point, another engine is started. This sequence can continue until all four engines are pumping if the load requirements so dictate. Intermediate loads are automatically met with a suitable number of engines.

Controls are arranged to prevent short cycling. Prelubrication of the engines takes place for about two minutes before engine starting. Then the unit is idled for two minutes, after which the engine is automatically loaded in accordance with the pumping requirements. When the water is pumped out, the engine idles for 15 minutes before shutting down to be ready for any new surge of demand.

Finally, a look at "Electrical Power Generation"



One engine operates with two standbys for automatic backup. Elaborate control and piping arrangements maintain lube and water levels and fuel supply during long, unattended operation.

Little Engine, Big Performance

THE smallest diesel engine built by Fairbanks, Morse & Co. is their 5¼-hp Model 45; the largest built is their huge 3500-hp Model 31.

But, though the Model 45 is small in horsepower, it is big in performance. Three of these single-cylinder diesels are installed high in the mountains in each of the five radio relay stations owned by the Salt Lake Pipe Line Company.

Perched like eagles in their nests, each of these relay stations, located on mountain peaks completely inaccessible during the winter months, are on a continuous 24-hour-a-day operation. They run throughout the year without any attention except for an annual inspection.

The accompanying table shows the total number of operating hours per engine per station.

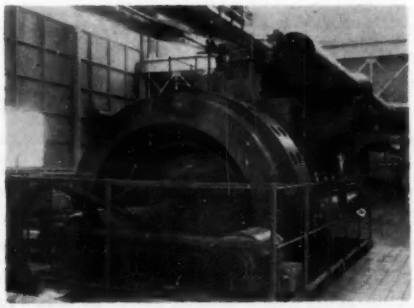
It is significant to note that Engine No. 1 at the Cinnibar Station when examined this spring had operated 8630 hours and was still running.

The No. 1 engine at the Emily Station had clocked over 9000 hours when it was shut down for examination and the cylinder liner wear was less than 0.002-in. The piston pin and connecting rod bearing were in excellent shape and were used again following inspection. Similar reports were made on other No. 1 engines which operated during the entire year unattended.

All in all, the owners feel that the little engines have done a big job in a big way and are happy with their combination of good installation, good maintenance, good fuels and lubricants—and good diesels.

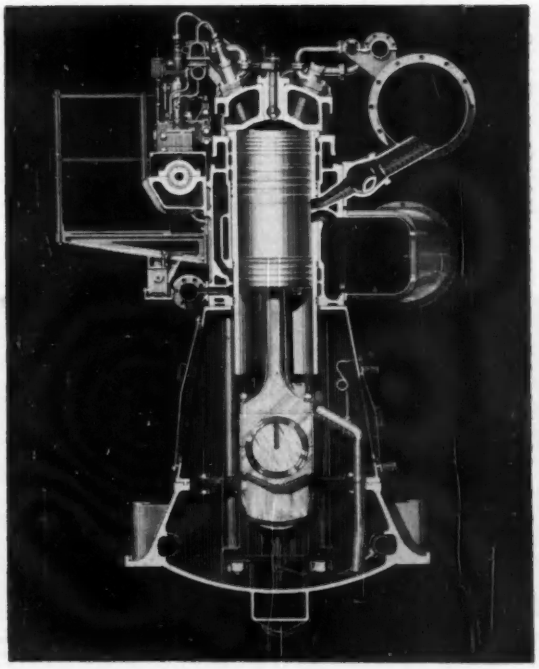
Station	*Engine #1*	*Engine #2*	*Engine #3*
Emily	19,945	10,858	1,841
Bald Ridge	10,012	7,292	4,174
Cinnabar	11,881	8,044	1,851
Harrison	16,394	6,719	2,973
Willard	16,033	10,516	8,352

Good reason why the small F-Ms installed here must operate continuously with infrequent inspections. These unattended mountain-top stations are inaccessable most of the year.



Decatur's (Indiana) Hamilton engine cuts costs by burning heavy fuel. Cross section of engine at right.

B-L-H's Heavy Fuel Installations



A MAJOR factor in electrical power generation is the fuel cost. Where engines turn out kilowatts hour after hour, day after day, and in a very competitive field, any saving in fuel cost snowballs rapidly. Fuel is generally the largest item in the operating cost bill. This will explain why so much work has been done during the past year in the direction of burning lower-grade—and cheaper—fuels.

Baldwin-Lima-Hamilton Corporation, for example, points to their continuing research to improve the economics of burning gas and residual oils. They have fully recognized the need for specific improvements in the burning of these fuel in spite of present day efficiencies, because these are the fuels which enable the diesel to compete most strongly with steam for power

generating purposes. In addition however, B-L-H engineers are keeping fully abreast of other developments, both at home and abroad, which will add to the diesel's economic performance.

Specifically, B-L-H has increased the flow capacity of its exclusive rotary valve on its 21-SA line of engines. This includes giving the valve a greater area and enlarging and further streamlining the breathing air passage. The result has been an even further increase in horsepower output because of the improved scavenging and combustion conditions.

Cylinders are more thoroughly scavenged of burned gases, therefore they operate cooler and more clean air is entrapped on the compression stroke. The heavier charge of clean cooler air improves combustion so that the Hamilton diesel can operate continuously on overloads using gas with a minimum of pilot oil and with no detonation, or on No. 6 residual oil fuel with an invisible exhaust.

Results of this work are shown in the performance of a 12-cyl, Model 1221-SA engine, rated 5380-hp at 240 rpm, in the Decatur, Indiana Municipal Power Plant. It was installed to team up with a steam plant with the use of the two forms of power split up so as to realize the cheapest overall generating cost. Burning a No. 6 residual fuel, the diesel won hands down, and on the basis of its performance further dieselization was planned.

Worthington's at Waverly Burn Propane

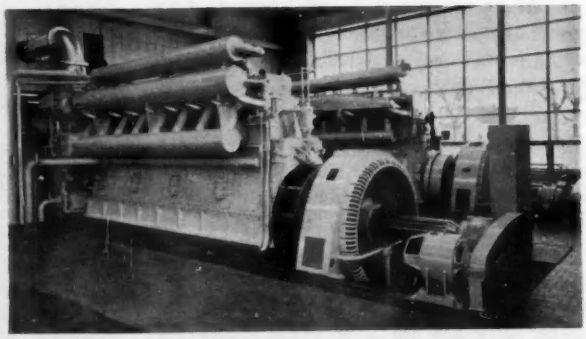
IT looks like one of the features of 1954 with respect to power generation was the emphasis on burning the lowest-cost fuel available. Worthington Corporation ran into a set of circumstances at the Waverly, Iowa, "West Power Plant" where it looked like burning propane would solve a lot of problems. Waverly's problem was economic; Worthington's one of engineering. It was a challenge and Worthington initiated the project.

Early in 1954, after two years of field research, it was demonstrated that Worthington's large-bore as well as small-bore engines would operate successfully on propane. This fuel was burned with full oil-diesel compression and using a minimum of pilot oil. This was accomplished with the newest SEHGO-8 dual-fuel diesel incorporating the latest features of Worthington's dual-fuel diesels.

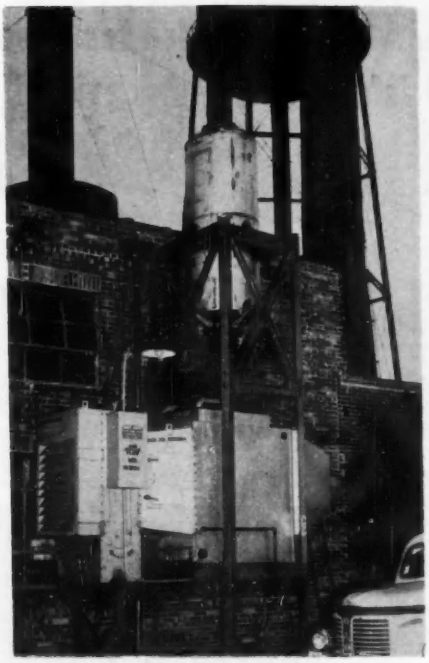
Experimentation was originally started on an earlier engine (shown in the background). It was installed in 1948 as a straight-oil diesel and converted to dual-fuel in 1951. Mixing propane with oil in about equal proportion during initial operation, immediately produced a major improvement in fuel consumption.

Final experimentation was completed on the later and up-to-date SEHGO-8 installed in 1952. The successful conclusion of this research program adds still another fuel choice for consideration in Worthington's engines when selecting the lowest-cost fuel in a fluctuating market.

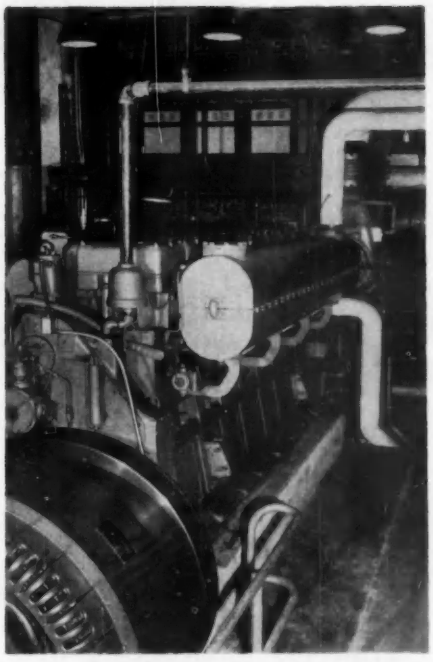
Waverly says it is Iowa's best lighted town. Its new West Plant is efficient, functional and attractive.



Showing a broad fuel appetite, engine in rear first burned fuel oil, then gas with pilot oil, now propane with pilot oil. Both engines are now on this diet.



Intake air filter, precooler and exhaust silencer arrangement at Breese, Illinois Municipal Power Plant.



Integrated with a steam plant, this Model JS Cooper-Bessemer engine has reportedly taken over full load.

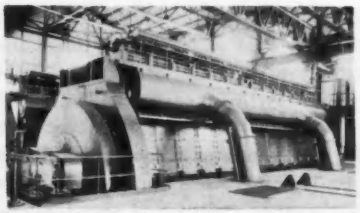
Cooper-Bessemer Ups Ratings with Engineering Advances

OUT in Breese, Illinois, the Municipal Power Plant is reaping the benefits of Cooper-Bessemer's engineering advancements. C-B points to the fact that the combination of several unusual features really pay off in greatly increased horsepower and unusually high thermal efficiency. To be specific, their 8-cyl, 13-in by 16-in, supercharged JS engine develops 1435 hp at 450 rpm—a rating out of the question a few years ago but now proved conservative.

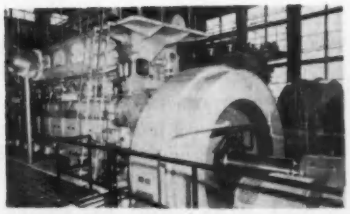
To get this rating, C-B added, in addition to supercharging, pre- and after-coolers employing a Vapor Phase cooling system. Further adding to the economy and overall plant thermal efficiency, steam from the engine's cooling water jackets is used to heat boiler feed water for the previously installed steam turbines.

It is reported that in spite of the high output, the unit continues to operate quietly, smoothly, and with no noticeable surrounding heat. In short, this is another example of how the user is getting the benefits of more for his fuel dollar—more power from the same engine size—and still retains all the inherent qualities of diesel engines. And all through engineering advances.

Chicago Pneumatic engines power New York's Rockaway Sewage Treatment Works.



Nordbergs supply electrical power for nitrate processing and general use in Coya Sur, Chile.



Fairbanks-Morse units replaced steam equipment in Bluffton, Indiana to cut fuel costs.

Increased emphasis on service—expanded facilities and broader dissemination of information—was evident . . .

With more and more engines going into service, the necessity for a broader base of parts availability and service information gained greater recognition. Make no mistake about it, users want service and want it fast. Downtime is too costly. There was a definite improvement in the flow of service information. We know; we were able to get more of it and pass it on as a service to the industry. Here's how one company gets the word around.

Large semi-trailers will carry the 1955 GM mobile service training units to the user.

Live cutaway models of engines and assemblies, along with tools for tune-up and trouble shooting comprise just a part of the training aids.

Detroit Diesel Expands Mobile Service Schools

"YOU and your mechanics are cordially invited to attend a diesel service training course designed to help you reduce your operating expense, minimize downtime, and obtain maximum life from your GM diesel engines."

That's an invitation the Detroit Diesel Engine Division and its distributors have been extending to General Motors diesel engine owners since 1948. But today the invitation means more than ever before.

Facilities of Detroit Diesel's mobile training schools have been expanded so that each unit on the road will now be able to offer a complete training course on each of the three series of GM diesel engines and GM industrial torque converters.

Equipment is now carried on diesel tractor-trailers which are twice the size of former units. Training aids for each series engine and the torque converter units include live and cutaway models, sub-assemblies, slides, films, and all tools necessary for trouble-shooting, tune-up, and the assembly of various components.

Recognizing the importance of preventive maintenance and factory-approved servicing procedures more and more, owners are profiting yearly by attending these courses. The classes are conducted by specially trained instructors from Detroit Diesel's factory service school and are from one to five day duration, depending upon trainees' needs. Since Detroit Diesel started its mobile training program six years ago, over 25,000 diesel owners, operators, and mechanics from coast to coast have taken advantage of it.

In 1954, with new and larger service training units on the road, Detroit Diesel and its distributors are equipped better than ever to help owners get the performance and long life that has always been built into GM diesel engines. And more than that, this helpful training is brought right to the owner's back yard.

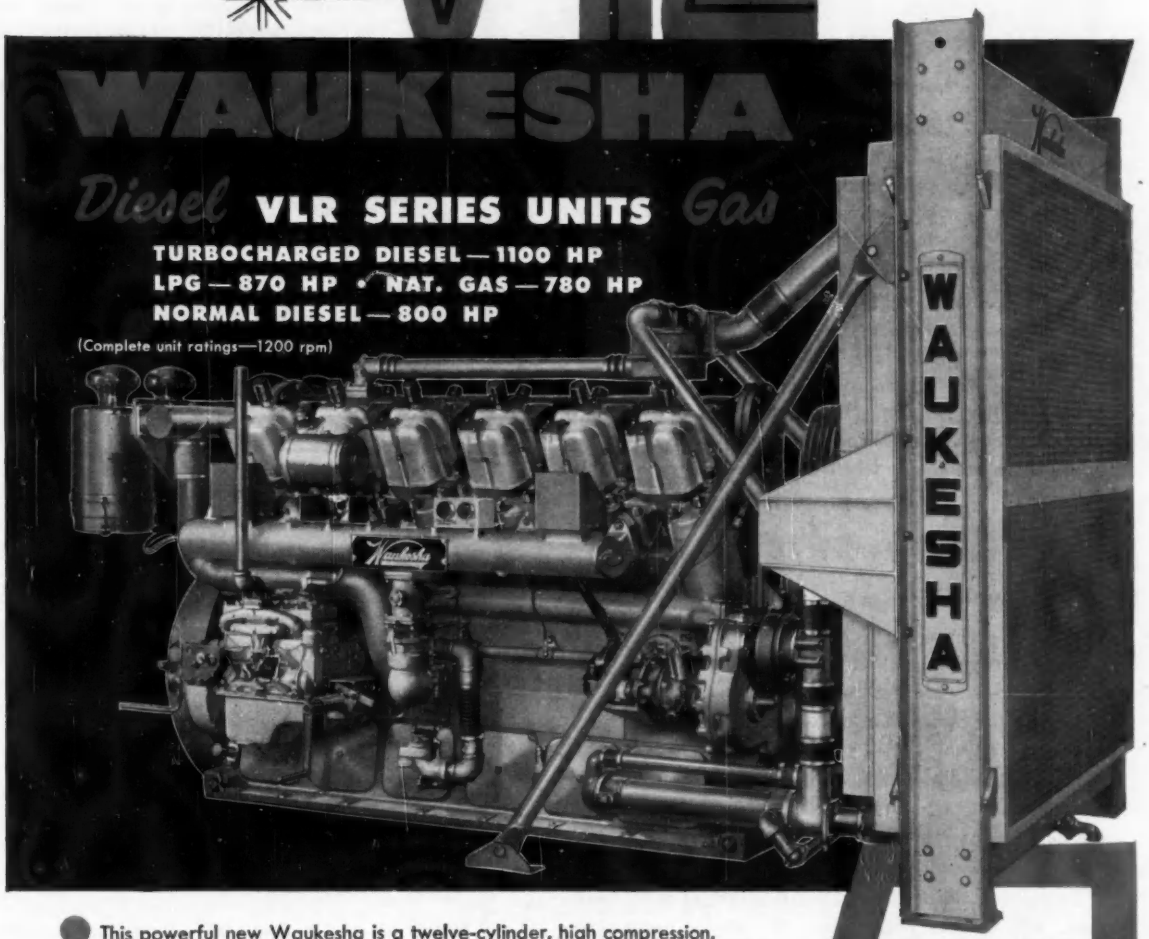
NEW V-12

WAUKESHA

Diesel **VLR SERIES UNITS** *Gas*

TURBOCHARGED DIESEL — 1100 HP
LPG — 870 HP • NAT. GAS — 780 HP
NORMAL DIESEL — 800 HP

(Complete unit ratings—1200 rpm)



● This powerful new Waukesha is a twelve-cylinder, high compression, overhead valve, 60-degree vee, four-cycle engine of 8½-inch bore and stroke, and 5788 cubic inch displacement. Connecting rods are side by side type; opposing pistons operating from a single wide-area crankpin. Bare engine ratings at 1200 rpm are: Turbocharged Diesel, 1135 hp; Normal Diesel, 830 hp; Butane-Propane, 900 hp; Natural Gas, 810 hp. Response to throttle and load requirements is quick and smooth, with a fast surge of reserve power for emergency and overload demands. Tremendous in power, remarkably rugged, the V-12 is designed for simplicity and reliability. Major parts are interchangeable between right and left cylinder banks. Main and rod bearings are easily accessible. Strength, precision and balance are built into all elements of the power train, from pistons to flywheel. Supporting members are designed for extreme rigidity and perfect alignment of moving parts. Send for Bulletin 1656.

WAUKESHA MOTOR COMPANY

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●

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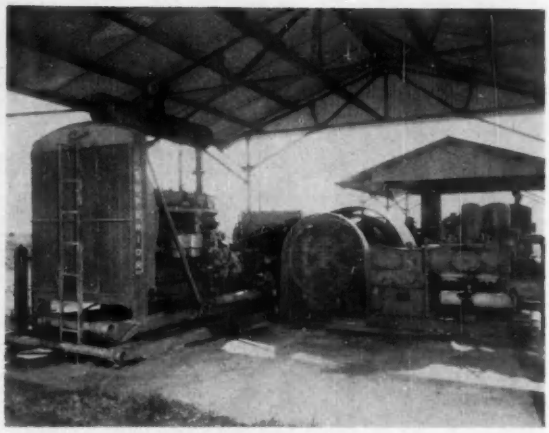
LOS ANGELES

news of our industry

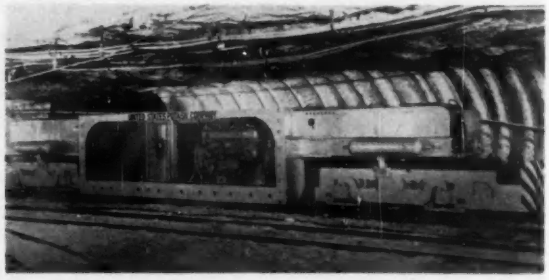
Another Superior for Rowan Oil



Back in 1951, the Rowan Oil Company installed a Superior Model G-510 engine, driving a pair of Worthington compressors near Danbury, Texas. A similar engine and compressors were installed at the same location in 1954. Both stations can be seen in the illustration with the new installation in the foreground.

These two compressor stations are used by the Rowan Oil Company to compress natural gas which is utilized to "gas-lift" oil wells. The compressors are driven off a 23-groove sheave carried on a 4½-in driving shaft and coupled to the stub shaft with a Falk Model 16F standard steel-flex coupling. A Woods clutch is used. Air-cooled intercoolers are inserted between the stages of compression.

World's Largest?



What is perhaps the world's largest and most powerful underground diesel-electric locomotive has recently been placed in service at the Carlsbad, New Mexico mine of the United States Potash Company.

Built by GE's Erie, Pa. locomotive and car equipment plant, the locomotive is just over six feet high, over 47 ft long, and was built for high underground speeds in the haulage ways of the Potash mine. It can travel 37.5 mph.

Taking advantage of every possible inch of mine clearance, 420 hp was packed into this 40-ton locomotive which successfully and snugly negotiates the mine's underground burrows in record time. Unusual size was necessary to accomplish underground work without hooking up locomotive units in tandem. The potash locomotive is capable of pulling 800 to 1000 tons on a level track depending on track conditions.

A special exhaust-gas conditioning system reduces the temperature of the engine from 1000°F to 650°F or less by scrubbing the gases in large water tanks. To get the locomotive into the mine, it had to be dismantled and reassembled underground. There was no way of getting it through the mine's main opening—a shaft measuring just 46-in by 66-in—except by lowering it into the mine in pieces. This necessitated using bolted construction for the locomotive frame.

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news of our industry

B&W Turbocharged 2-Cycle

In the municipal works of Frederikshavn, Denmark, a 3400-bhp Burmeister & Wain diesel generator set has been working for a year. The unit is a 6-cyl turbocharged 2-cycle crosshead engine with exhaust poppet valves. Normal continuous service output is 113 psi. Permissible overload amounts to 10% for one hour. This 3400-bhp service output is said to be slightly higher than that obtainable from an 8-cyl engine of the same size without turbocharge.

The engine has two Brown Boveri turbochargers, each connected to three cylinders. No additional blowers are installed; they are the only means for supplying scavenging and charging air. Starting from cold and idle running is said to be as reliable as for non-turbocharged 2-cycle engines with chain-driven positive displacement blowers. The air drawn from the engine room is passed through two salt-water air coolers before being discharged into the engine's scavenging air space.

About the first 2000 hr of service, the engine had run solely on diesel fuel. Currently, the engine is running on light boiler oil. Its uniflow scavenging and simple fuel injection system as well as complete separation between cylinders and crankcase make running on boiler oil suitable.

This is the first Burmeister and Wain engine of its type for stationary service.

Mexico Encourages Dieselization

The Mexican government has granted Diesel Nacional, S.A. 10 years of freedom from federal taxes, it is reported, in order to abet the growth of the industry. The organization has been established with the aid of Italian capital. Other manufacturing ties, it is rumored, are also being sought with German builders.

The government decree specifies vehicles with diesel engines for the trucking industry and passenger service, and engines for industrial and agricultural use.

No. 530 No. 539

Automatically stops the engine . . . if cooling water temperature goes above, or lube oil pressure goes below safe limits. This Sylphon Safety Control No. 530 will shut down small diesel engines direct and sound alarm, or serve as pilot valve to stop gas engines.

Automatically sounds an alarm . . . if water jacket temperature goes above, or lube oil pressure goes below safe limits. Or, this No. 539 Temperature-Pressure Switch will flash a warning light . . . or, if desired, shut down engine operation. "Fail-safe" feature.

Why risk engine trouble?

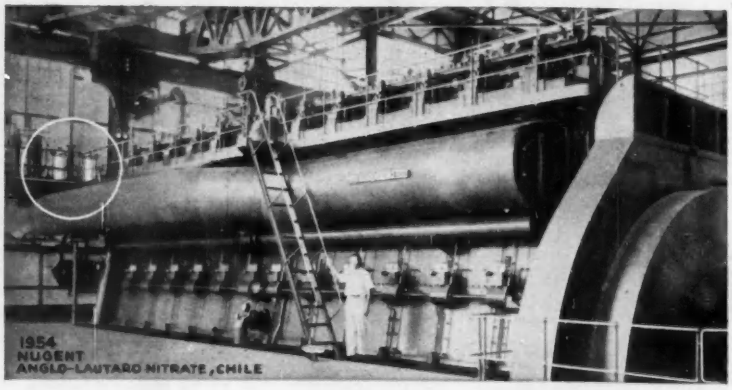
GET SYLPHON CONTROLS' PROTECTION

PLANT OPERATORS AND ENGINEERS find Sylphon Controls are big helps in guarding internal combustion engines against costly damage and shutdowns. These controls *stay* on duty round-the-clock—when *you* can't be on hand. Find out about these dependable, money-saving, long-lasting Sylphon Safety Controls. Write today for information. Ask for Catalog AD-817.

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • KNOXVILLE 1, TENN.

MOST POWERFUL DIESELS



...rely on NUGENT FUEL OIL FILTERS!

● The giant diesel shown above is one of two, 9,600 hp. Nordberg engines installed for the Anglo-Lautaro Nitrate Corporation at their plant in Coya Sur, Chile. The diesels are the most powerful single units ever built in the Western Hemisphere.

Included as original equipment on each of these engines is a Nugent #4L4 twin transfer filter (shown in circle above) for preliminary fuel oil filtering and a Nugent #4L Duplex fuel oil filter (not visible) to provide the final filtering. The Coya Sur installation is another example of Nugent filters being installed as original equipment by a leading diesel manufacturer.

Size for size, Nugent filters of the above type offer greater filtering area than any other filter on the market. In addition, the lubricating oil filters make possible a choice of full flow or by-pass with the same unit. Simple piping makes installation no problem.

No matter what the size of your own diesel power supply—no matter where it is installed, there is a Nugent fuel or lube oil filter to meet your needs. Write for complete information.

◀ Close-up of a Nugent #4L4 filter of the type used for fuel oil transfer on the giant diesels at Coya Sur. Recharges are inexpensive and simple to replace.

▶ Nugent duplex filter of the type used for final fuel oil filtering on the diesels at Coya Sur. By actual test, removes 99.8% of all foreign solids from fuel oil.

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news of our industry

RR Dieselization Boon To Town

A side result of the dieselization of the Rock Island Lines has provided a new source of water supply to the little city of Santa Rosa in east central New Mexico. The railroad owned three lakes, a total of 195 acres, near the town. Since the water is no longer needed for steamers, Santa Rosa, which has been hard pressed for water for its growing population, got the lakes as a gift.

The importance of the supply to Santa Rosa is indicated by the large celebration held to salute the transfer. The ceremony was recorded by the National Broadcasting Co. for presentation on the John Cameron Swayze News Caravan.

Bond Issue for Road Building

Gen. Lucius B. Clay, chairman of President Eisenhower's committee on the highway program, announced that the committee is considering proposing the establishment of an authority which would issue $26 billion in bonds to step up road building during the next 10 years. He made the disclosure in an address before the final session of the annual meeting of the American Petroleum Institute, and emphasized that no decision has been reached.

Under the bond proposal, the general said that the government would use its gas and oil tax receipts to amortize a special bond issue over a period of 25 years, but expenditure of the fund would be made during the next 10 years. "This would finance 40,000 mi of interstate highway system that would have suitable entrance and exit facilities to our major cities," he stated.

He pointed out that the $26 billion figure is over and above the $50 billion previously planned. The question of limited-access roads would receive study. He predicted prosperity for the next 25 years, basing his beliefs on reduced international tensions and an upward swing in basic industries, which will result in marked increase in vehicle traffic on the highways.

news of our industry

Service Unit for Jet Planes

Consolidated Diesel Electric Corp. has engineered the MA-1, a self-propelled servicing unit which combines the functions of five separate pieces of equipment formerly used by ground crews in towing, servicing, and starting jet planes. A variation is also being manufactured to service pilotless aircraft and guided missiles.

The units resemble an elongated military jeep with windowless stationary body. The MA-1 can be operated by a single driver-operator. When used by a larger crew, it is a mobile workshop that eliminates need of running back for additional gear. It has been tested in the Arctic and on rough terrain.

It was recently demonstrated for the first time by the Air Force's Tactical Air Command and revealed a towing capacity to fill the requirements of existing light or medium fighter-bombers, and has towed the giant inter-continental B-36. Sufficient AC power is provided to test and service electronic equipment of all Command aircraft, and it has sufficient DC capacity to start any jet engine. More than 400 are said to have already been delivered to various air bases.

Production Engineering Show

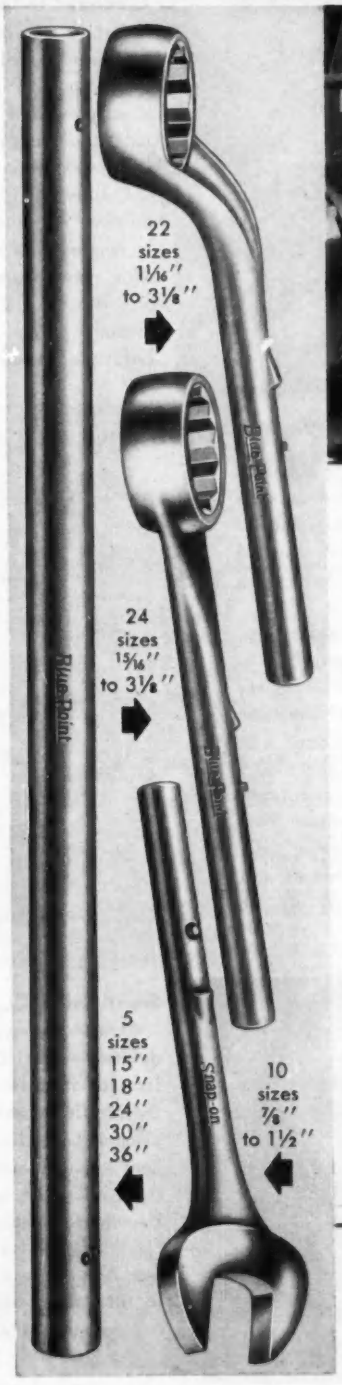
A new industrial exposition, the Production Engineering Show, will be held in Chicago next September 6th to 17th to run concurrently with the Machine Tool Show. A fleet of buses will shuttle visitors between the two.

The exhibition will cover the new field of automation and is an independent venture of Clapp & Poliak, Inc., managers of the machine show. This will give manufacturers of accessory equipment for machine tools an independent exposition for the first time. The Machine Tool Show, first held since 1947, will only display machine tools. Advance registration may be obtained from the managers at 341 Madison Ave., New York 17, N. Y.

Snap-on* Blue-Point

HEAVY DUTY BOXOCKET OPEN END WRENCHES

SPEED MAINTENANCE WORK



HERE'S POWER and versatility to speed up your bigger nut turning jobs. The quickly interchangeable combination of straight Boxockets, offset Boxockets and Open Ends gives your mechanics a choice of wrench heads to reach nuts in locations with different clearance problems. Wrench heads can be used without handles to run down nuts quickly, and the handle slipped on for final tightening. All wrenches have a handle stop to easily locate the locking button. Wrench and handle lock solidly—can't be separated accidentally—an important safety factor. Available in a wide range of wrench sizes and handles.

There are more than 4,000 quality tools in the Snap-on line. Direct service to industry through 43 factory branch warehouses. Write for new Snap-on Industrial Catalog.

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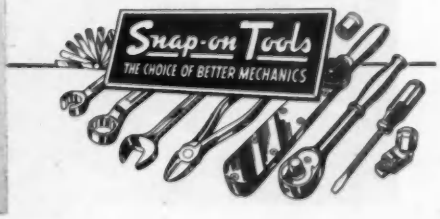
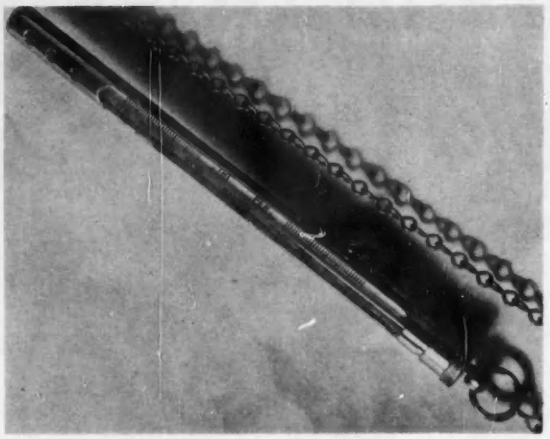


new products

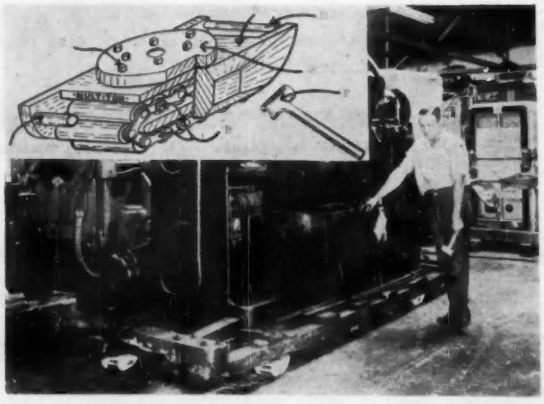


Torque Limiters

A line of torque limiters has been made available by the Morse Chain Company in 11 standard sizes with maximum torque capacities ranging from 20 to 260 ft-lb. Outside diameters are from 2 in to 3⅞ in and they can be mounted on shafts with diameters ranging from ½ in to 2½ in.

The overload protection devices feature new high-friction wearproof friction discs, according to the manufacturer. They are designed to act as automatic shear pin mechanisms and avoid the time and labor required to insert new shear pins.

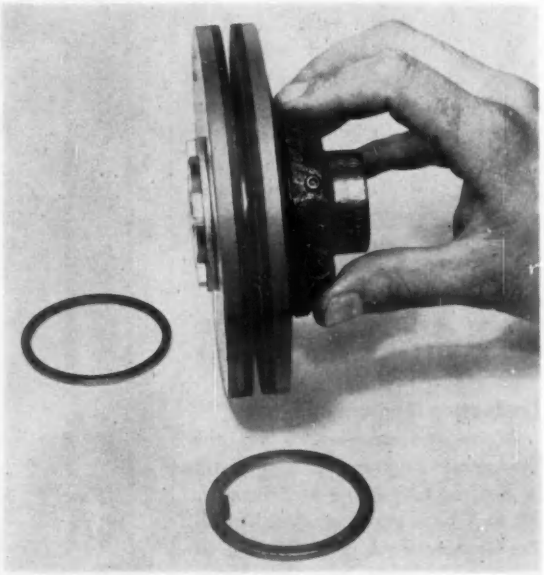
The discs, which are not bonded to the clutch plates, are an asbestos, phenolic resin and brass chip mixture molded under high pressure. This reportedly produces a lining having stable friction qualities under a wide range of pressures and temperatures which does not absorb oil or moisture.



Cleanout Indicator

Ramco has introduced a cleanout indicator for users of vapor degreasers. Developed to save money in cleanout costs, the instrument is designed to indicate the exact condition of the solvent in the degreaser. It eliminates the guess work and makes it a simple and effortless job to maintain an accurate check at all times.

Calibrated for both trichlorethylene and perchlorethylene solvents, the indicator is easy to read and may be carried as readily as a fountain pen. It comes complete with a performance and control chart and instructions on "How to Clean a Degreaser". Details and price are available from Ramco Equipment Corporation, 1373 Lafayette Avenue, New York 59, N. Y.



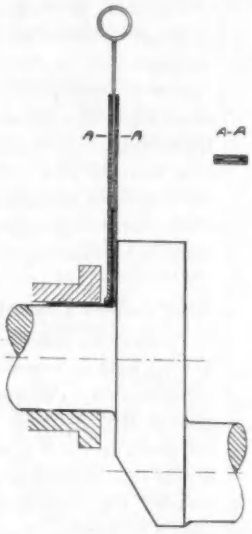
Small High-Capacity Dolly

Called the Multiton, these compact, high-capacity dollies were originally developed by Stokvis-Edera & Co., Inc. for its own use in moving heavy machinery. Now the Multiton has been placed on the market to take the place of roller bars and pry bars used to move and place heavy machinery. The units are actually a self-laying track dolly. Parts are as follows: A—alloy steel frame; B—endless chain of rollers; C—hardened gripping "teeth"; D—cross bars; E—turntable, which carries load; F—connector for attaching to either cross bar (D) to turn roller skid. Literature describing the Multiton roller skid is available.

Feeler Gauge

Burmeister and Wain has introduced a new feeler gauge designed to lower maintenance costs. The gauge is for use with the larger diesel engines and makes it possible to check bearing clearance directly, and without dismantling the engine as is necessary when using a bearing lead according to standard practice. Misalignment of the main bearings or the failure to discover excessive bearing wear in time have been found to be the cause of more than 50% of all crankshaft failures, B&W tells us.

The new feeler gauge consists of a flat tubing, having



the lower end bent through a right angle. Inside the tubing or sheath is a sliding rod, to the end of which is soldered a feeler gauge blade. This blade can be pushed out the end of the sheath at a right angle, into the bearing clearance space. A stop on the rod prevents it from being pulled all the way out of the tubing.

Available from Burmeister and Wain American Corporation, 17 Battery Place, New York 4, N. Y., the patented Bearing Feeler comes as follows: .004-in, .008-in, .012-in, .016-in, .020-in, and in metric dimensions 0.1, 0.2, 0.3, 0.4, and 0.5 mm.

Corrosion-Resistant Primer

"LockPrime", a corrosion-resistant liquid primer for new or corroded steel surfaces, has been developed in the laboratories of the Pennsylvania Salt Manufacturing Company. According to the manufacturer, the primer forms a tight adherent bond to the surface of sandblasted new steel or wire-brushed rusted steel.

Applicable to all ferrous metal surfaces, tile red LockPrime contains 28% solids content by weight and covers 200 sq ft per gal per 1 mil coat. Since the bond strength of this primer reportedly increases with age, immediate application of the top coat is not necessary. Specifications and directions are available from the company at 1000 Widener Building, Philadelphia 7, Pa.

it pays to know the EXACT RPM of your DIESEL ENGINE!

Get maximum efficiency
longer engine life

for BUSES • TRACTORS TRUCKS • BOATS

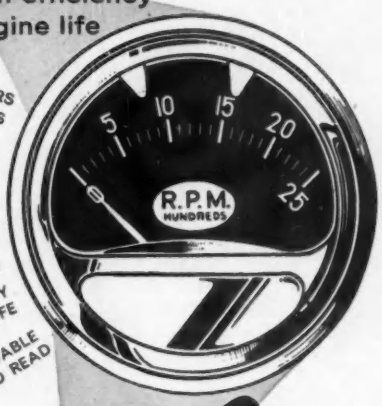
EASY TO INSTALL NO DRIVE CABLES

6, 12, or 24 VOLT ILLUMINATION

SELF-POWERED NO BATTERY DRAIN

HIGHEST ACCURACY LONGEST SERVICE LIFE

RUGGED, DEPENDABLE EASY TO READ



with new Sun
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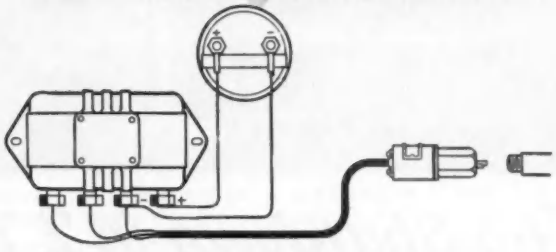
ELECTRIC TACHOMETER!



Now, New Sun Mechanical Drive Electric Tachometer for diesel engines gives consistent, more accurate RPM readings for greater diesel efficiency and economy!

Operation is simple and foolproof. The new Sun Power Units are available for standard S.A.E. drive ratios—and S.A.E. mechanical drive outlets. Troublesome, long drive shafts are eliminated. The Sun Transmitter Unit attaches to any S.A.E. mechanical drive outlet where electrical impulses are picked up and transmitted to the Power Unit and then relayed to the "Tach" head in terms of RPM.

YOU GET GREATER ECONOMY . . . HIGHEST ACCURACY—with SUN! "Tach" Head has illuminated dial with adjustable arrows to indicate safe, economical RPM range! Jeweled D'Arsonval movement, Alnico magnet and rugged double bridge construction gives accuracy to 2% of full scale AT ALL ENGINE SPEEDS!

CLIP THE COUPON—MAIL TODAY! Complete information will be sent immediately.

665

for greater GASOLINE ENGINE economy . . .

SUN ELECTRIC TACHOMETER

SUN DRIVING GAGE

for passenger cars

SUN ELECTRIC CORPORATION
Tachometer Div.
6395 N. Avondale, • Chicago 31, Ill.

Please send me complete information on:

(DIESEL)
☐ SUN Mechanical Drive ELECTRIC TACHOMETER

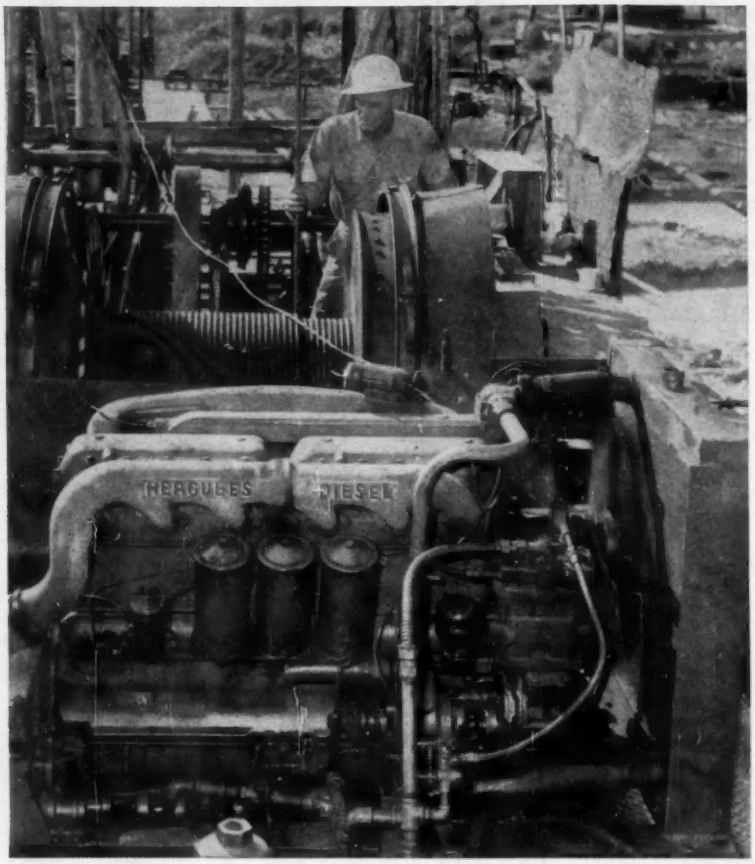
(GASOLINE ENGINE)
☐ SUN ELECTRIC TACHOMETER
☐ SUN DRIVING GAGE

NAME_____

ADDRESS_____

CITY_____ STATE_____

Case History of Dependable Service



"No Shutdown in 2 Years!"

This Hercules Diesel Engine Model DFXE has operated for over two years without time-out for engine repairs, by the K. B. Knox Drilling Co. The master mechanic took great pride in explaining to us the operating record of this engine and its economy during 24 months of "trouble free" service.

This is just an example of the dependable service which is "built-in" all Hercules Diesel Engines. Of course, good maintenance is important in the operation of any engine but the engineering and manufacturing "know-how" of Hercules Motors Corporation is an important first step for any operator to consider.

Hercules has been building engines since 1915. Some of those first engines are still working for their owners. For similar dependable service it will pay to investigate the use of Hercules Diesel Engines in your equipment. Our engineers will be happy to work with you in solving your diesel power problems.

Engine Manufacturing Specialists Since 1915

HERCULES ENGINES

HERCULES MOTORS CORPORATION

125 Eleventh Street, S. E. • Canton, Ohio

new products

Table-Type Blast Cleaner

For various cleaning and peening applications, American Wheelabrator & Equipment Corp., Mishawaka, Ind., is producing a table-type airless blasting machine requiring no pit for abrasive hopper and built for floor level installation.

Intended for cleaning castings, forgings, heat-treated parts, etc., the machine has a 40-in work height clearance and the table can hold a few large pieces or many small parts at one time. Metallic parts can be peened in it to increase their fatigue lives. The table is 72-in diam, mounted on the door. Abrasive is propelled by centrifugal force. Blasting is automatic.

Snap-Action Thermostat

To meet the need for a thermostat having both a heavy-duty load carrying capacity and small differential, Fenwal Inc., Ashland, Mass., has developed a series of liquid-filled, snap-action type thermostats. It is recommended for applications where the ability of the thermostat itself to carry heavy electrical loads (20 to 35 amps) without relay is more advantageous than the precision temperature response (0.1°F) thermostat which has lower load carrying capacity.

Two models, for remote and direct (local bulb-type) installation, are available. The local bulb unit is for use over an adjustable 50°F to 300°F range, while the remote unit is available for two ranges—50°F to 250°F and 150°F to 550°F. Up to 25 ft of tubing can be furnished with the remote model.

The local bulb thermostat consists essentially of a sealed bellows encased in a liquid-filled outer shell, plus a sensitive snap switch in direct linkage. On temperature rise, the liquid expands against the bellows causing it to trip the snap switch and thus operate the electrical contacts. In the remote model, the control mechanism is housed in a flanged case which can be mounted on any flat surface.

new products

Cat Packages Torque Converters

Two series of packaged engine torque converter units engineered for its three largest diesel engines, D397, D386, and D375, have been announced by Caterpillar Tractor Co., Peoria 8, Ill. Typical applications for which the units are adaptable include locomotives, oilfield equipment, yarders, shovels, and draglines.

One series is identified as D397-16-1, D386-16-1, and D375-16-1. It consists of the standard engine, radiator (suction or blower fan), 3-stage torque converter, output drive shaft, rear support, and torque converter fluid cooling and charging systems designed in conjunction with the engine fuel system so that no special torque converter fluid is required.

The other series, designated D397-16-2, D386-16-2, and D375-16-2, is identical to the 16-1 series except that a disconnect clutch is applied between the engine and torque converter. Optional equipment available for all the units includes engine-mounted air compressors, output shaft governor drives, ledge-mounted bases, shallow and deep oil pans, structural steel bases, and engine throttle air controls.

Contact Burnishing Tool

P. K. Neuses, Inc., W. Euclid and Dwyer Sts., Arlington Heights, Ill., is manufacturing a contact burnishing tool which is non-residual, leaving no filings, grit, dust or film on the contact point to start a new carbonaceous buildup. It was developed for any type of contact.

Contact material removal is claimed reduced to a minimum due to the very hard and very mildly abrasive surface on both sides of the blade. The tool is designed with just enough stiffness for right amount of pressure to be applied to the contact face, and is flexible to permit getting into cramped places. Its dielectric plastic handle also acts as an insulator for working on live contacts.

Downtime?

What's the Price Tag on Yours?

You can't get away from downtime—
BUT you can reduce its frequency.

For instance, how much less downtime would you have if the cylinder liners in your diesels were more resistant to wear?

No cylinder liner is wearproof — BUT liners with PORUS-KROME plated bores will last *three* to *five* times longer than raw cast iron liners — AND engines with PORUS-KROME liners use *less* lube oil.

Specify PORUS-KROME liners for your next diesel, or reclaim worn liners with PORUS-KROME.

In either case you will be sure to have less downtime and more economy.

Write for a copy of "on PORUS-KROME", a twelve page illustrated brochure that describes the PORUS-KROME process.

Address -
Dept. DP-1, VAN DER HORST CORP., OLEAN, N. Y.

*PORUS - KROME
Good for the Life of your Engines

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TERRELL, TEXAS
OLEAN, NEW YORK
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*U. S. Patents
2,048,578. 2,314,604. 2,412,698

**SparTan Engineering
West Coast Licensee

new literature

Navy Ignition Studies

Better diesel fuels is the goal of research described in a U. S. Navy report concerning the influence of molecular structure of fuels on ignition. Entitled "Ignition Properties of the Isometric Hexanes (Ignition Studies, Part III)", it indicates that highly branched hydrocarbons are more difficult to ignite than the straight-chain hydrocarbons of the same molecular weights.

Ignition diagrams are given to show the effect of temperature and oxygen percent on ignition for the five isometric hexanes and for iso-octane. It was found that 3-dimethylbutane and iso-octane, both having high octane rating, consisted chiefly of cool flames even when using pure oxygen. Other structural difference effects were obtained from ignition delay measurements.

A new ignition factor, the minimum ignition point (MIP), was developed from data obtained in this study. Since MIP is a measure of ease of ignition, it may be important in estimating cetane number or other ignition quality factors. The 22-page report is available from the U. S. Dept. of Commerce, Washington 25, D.C. for 75¢.

Combustible Gas Analyzers

Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa., has issued a 20-page brochure describing its combustible gas analyzers and alarms. It gives details of operation, part-by-part component description, typical installations, and schematics of assembly. Instruments to protect against most known combustible gases and vapors are detailed.

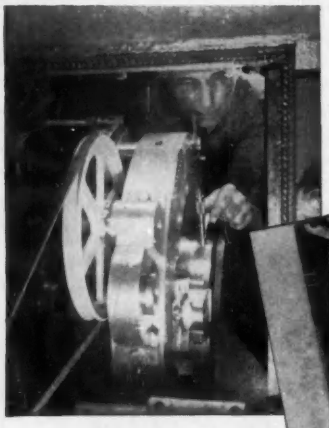
Crane Runway Rails

Specifications and other engineering data on crane runway rails and accessories are included in new literature offered by L. B. Foster Co., Park-Murray Bldg., New York 7, N. Y. Accessories described include rails, angle bars, stops, clips, bolts, and bearing plates.

Cam Clutch Reference File

A comprehensive 9-in by 11½-in reference file containing catalogs describing its complete line of cam clutches for indexing, overrunning, and backstop application, is obtainable from Morse Chain Co., 7601 Central Ave., Detroit 10, Mich.

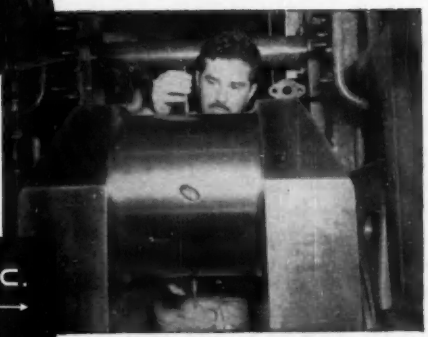
The file folder includes an 8-page catalog giving general information on the clutches including cutaway views, operating functions, line drawings, design features, and ordering information. Four catalog sheets list specifications, installation procedures, and lubrication information on the PB, HT, MC, and K series.



CRANK PINS REFINISHED IN PLACE

For engines of practically any size our Portable Machines are available for quick and economical restoration of damaged crank pins. Let us help you minimize down-time.

Requests for the purchase of these machines have become so numerous we have decided to manufacture them for sale and invite your inquiries.



Above illustrations show views of our Portable Crank Pin Machines at work in various size marine engines. At right a marine engineer checks the accuracy of a refinished crank journal.

Additional information furnished without obligation

WASHINGTON IRON WORKS, INC.
Established 1876
SHERMAN, TEXAS

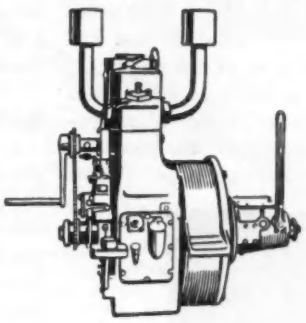
BUKH Diesel

YOU BET YOUR LIFE . . .

on the dependability of your lifeboat power. Recent submersion tests in New York harbor offered demonstrated proof that the BUKH Diesel runs smoothly and efficiently, and develops full power even while completely under water.

BUKH four-stroke cycle lifeboat Diesels are available in three sizes with outputs of 10, 20 and 30 horsepower, at 1500 r.p.m.

There is a BUKH 4-cycle full diesel tailored to suit your requirements for marine or land, stationary or mobile power. Fifty years of diesel experience is behind their outstanding dependability and economy.



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BURMEISTER & WAIN AMERICAN CORPORATION

17 Battery Place, New York 4, N. Y.

new literature

Electrical Conductor Manual

Available from Technical Editor, Kaiser Aluminum & Chemical Sales, Inc., 228 N. LaSalle St., Chicago 1, Ill., is a 190-page illustrated book on aluminum electrical conductors, designed as a basic guide in engineering aluminum conductor installations. It is available without cost if requested on company letterhead; a $2 charge is made to others.

The new book provides data on physical properties and electrical characteristics of all sizes and strandings of the conductor, latest information on its application to overhead distribution systems, and a basis for calculation of all accumulated data together with present specifications that govern the manufacture of Kaiser aluminum conductors.

Basic engineering data are presented throughout to enable the user to evaluate the essential design information, by simple calculation, and thereby determine what is necessary for a specific job. About 72 pages of industry specifications have been reproduced for reference. Special attention in the design of the book enables the reader to find desired data rapidly. It is sectionalized, with a comprehensive table of contents, and text and tables are in easy-to-read type.

Battery Selection Techniques

Designed for engineers and supervisory personnel in power stations, electric utility companies, etc., is a revised manual dealing with storage batteries recently announced by The Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa. It deals with batteries for standby power, emergency lighting, and switchgear applications.

The 28-page manual includes a discussion of charging equipment. Simplified battery maintenance techniques are also contained. Installation procedures are detailed and illustrated by photographs.

Daros Piston Rings

Daros American Corp., 1737 Howard St., Chicago 26, Ill., distributor for the Swedish firm of Ab. Davy Robertsons Maskinfabrik piston rings, is preparing a 24-page catalog designed to acquaint the industry with the quality of the product.

The Swedish firm, specialists in manufacture of piston rings and cylinder liner castings, has been in operation since 1851. The catalog will describe its foundry and manufacturing processes as well as illustrate some 30 different styles of rings. Illustrations will also include different views of the company's manufacturing facilities.

Gas Turbines for Pipelines

General Electric Co., Schenectady 5, N. Y., has issued GEA-5962, a 12-page booklet explaining the application of gas turbines to gas pipeline pumping. Detailed information is given on operation and application, along with illustrations and drawings to help explain use.

organizational news

New President of Fram

Theodore H. Belling was elected president of Fram Corp. at the annual meeting of its board of directors. He succeeds Steven B. Wilson, who has retired from the post but remains chairman of the board.

Mr. Belling has been with Fram since 1939, when he entered as general sales manager. He was promoted to vice president in charge of sales in 1940 and was named vice president and general manager in 1942.

In 1944 he became executive vice president and has served in this position until his recent election. Before Fram, Mr. Belling was with Black & Decker Co. for 20 years.

T. H. Belling

Battery Sales Manager

Robert L. Sommerville has been placed in the newly created post of general sales manager of the automotive division of the Electric Storage Battery Co. He will direct sales, advertising, merchandizing, and sales promotion activities for all battery products of the company in both replacement and original equipment automotive markets.

Mr. Sommerville first joined the organization in 1919 as a salesman. From that post he later advanced to manager of automotive replacement sales, on to manager of automotive sales, and in 1948 he became assistant general sales manager. He has twice been president of the Assn. of American Battery Manufacturers and continues to serve that organization as a member of the board of directors.

R. L. Sommerville

Here's Why

PERFORMANCE IS BETTER WITH Bendix STARTER DRIVES

CHECK and COMPARE THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.

It takes a truly outstanding product to receive over 100,000,000 endorsements. Yet, that's the number of Bendix Drives that have been installed. No other starter drive approaches this record of outstanding performance. That is why, whatever your type of diesel or whatever its purpose, it will pay you to specify Bendix* Starter Drive for the most economical installation and dependable performance. *REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of Bendix AVIATION CORPORATION

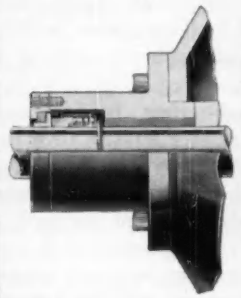
ELMIRA, NEW YORK

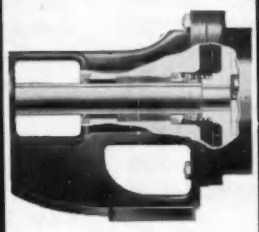
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N.Y.

VIKING

150 GENERAL PURPOSE PUMPS

54 HEAVY-DUTY PUMPS





NOW AVAILABLE WITH MECHANICAL SEALS

General Purpose all-weather Viking Pumps in sizes from 20 to 200 G.P.M. and Heavy-Duty Viking Pumps in sizes from 10 to 300 G.P.M. can now be furnished with mechanical seals. The seals are packaged units with a minimum of parts and no chance for mis-assembly.
Both types of pumps equipped with mechanical seals also feature carbon graphite bearings requiring no lubrication.
For leak-proof, long-lived service, specify mechanical seal equipped General Purpose or Heavy-Duty Viking pumps.
For additional information, ask for folders SP-336D and SP-344D.

VIKING AN HONORED NAME IN PUMPING

See Our Catalog in SWEET

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

KIENE®

MODEL K-120

universal peak firing and compression pressure indicator

The Model K-120 is the only maximum pressure indicator that can be used as a compression tester on small, high-speed engines and as a firing pressure indicator on engines having indicator valves. Patented Kiene diaphragm type check valve of stainless steel has no springs or piston, no complicated adjustments, temperature corrections or pressure loss. Bleeder valve permits release of indicator pressure for repeat readings. This instrument gives true pressure readings with an uncompensated gage.

Adaptors for most models U.S.A. engines. Others made to order at reasonable prices.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

organizational news

Enterprise Advances Two

General Metals Corp.'s Enterprise Div. announces the appointment of R. E. Kroeck to the position of manager of manufacturing and B. A. Robbins to manager of engineering.

Mr. Kroeck has a 30-year background with the company. He was most recently manager of production control and purchasing and before that served as purchasing agent. Mr. Robbins has been with Enterprise since 1947, starting as a material and process engineer. He held the post of chief products development engineer prior to his new assignment.

B. A. Robbins

R. E. Kroeck

Detroit Diesel Distributors

Two new distributors have been named by Detroit Diesel Engine Div., General Motors Corp., as having established factory-approved sales and service facilities for its engines.

T. E. Potts Equipment Co. will be representatives in Buffalo, N. Y. Cunningham-Ortmayer Co., Milwaukee, will take care of the state of Wisconsin.

Cat Forms Brazil Subsidiary

Sao Paulo, Brazil is the location of Caterpillar Tractor Co.'s second foreign subsidiary, which has just organized. The first is located in England. The new company will manufacture and sell bulldozers and scrapers, plus parts for the company's entire line of products.

Robert J. Loskill has been appointed managing director of Brasil, S. A.—Maquinas e Pecas, the new company's name. He has been with the company 19 years, in the post of sales development manager for the past year. Prior to that he was manager of sales training.

New Officers for Perfex

The board of directors of Perfex Corp. has elected Irving G. Bohrman president of the company and Ernest H. Panthofer as vice president.

Mr. Bohrman fills a vacancy left by the resignation of Carroll E Lewis. He has been serving as vice president and general manager of the radiator division. Prior to joining the company in 1940, he was associated with Hercules Motors Corp. and Waukesha Motor Co.

Mr. Panthofer most recently held the position of assistant general manager of the radiator division. He joined Perfex in 1941 after graduation from the University of Wisconsin. He is active in the Society of Automotive Engineers.

I. G. Bohrman

E. H. Panthofer

news of our industry

Jersey City Sewage Project

Worthington Corp. discloses that it is furnishing equipment for the $31 million project being constructed by the Jersey City, N. J. sewage authority, part of the interstate program for pollution control for New York Harbor and neighboring beaches. The project consists of two plants, West Side and East Side.

Three Worthington 6-cyl dual-fuel 990-hp engines driving 690-kw Electric Machinery generators will supply all electric power for both plants. A power line will be run between the two.

The sewage sludge will be pumped from the East Side to the West Side plant and the engines will be operated on gas from the digested sludge. Each plant will also have four Worthington main sewage pumps (two with Electric Machinery magnetic drives for variable speed control). Air compressors and other auxiliaries are also being supplied by the company.

Diesel Power for Arctic Army

A new kind of housing for soldiers on Arctic duty, which gradually sinks into the soft snow, has been developed by the Army, in an attempt to bend with nature rather than fight it. Conventional buildings sink and collapse in the snows of the Far North.

New sub-surface housing units have so far been built in Greenland for an isolated Air Force team. They employ the pressure-hull principle of the submarine and are built of tubes 18-ft in diameter and of varying lengths. They have interconnecting passageways and are ballasted like submarines to sink several feet a year on an even keel. The surface is reached through submarine-like hatches.

The units contain sleeping quarters, mess hall, and a recreation room. A special heating system maintains temperatures at 72°F when outside temperatures are as low as 75 below zero. Diesel generators supply the heat and electricity. The depth to which the units may sink has not been disclosed. However maximum depths will probably be determined by pressure building up under the tubes.

British Evolve Pulsating Filter

An English firm, Coronow Filters, Ltd., is producing a filter element which it claims assures long filter life. It was developed on a new principle which utilizes fluctuation in flow pressures to cause the filter matrix to pulsate between cylindrical gauzes or screens. This is said to loosen sediment collecting on the outer or inlet-side surface.

It is claimed that full life of the filter element is 100,000 to 150,000 mi for automotive engines. No attention is needed for the first 15,000 mi and only a brushing with paraffin or oil every 7000 mi thereafter. The only servicing required during normal operation is occasional draining of sediment and water from the base of the filter container. This element has been in use on the European continent for some time, it is said, and is being used by vehicle manufacturers and operators.

news of our industry

Diesel Rig Drills for Steam

With demand for electricity growing rapidly, New Zealand is studying the possibility of utilizing natural steam for generating power. North Island, one of the two principal islands that constitute the dominion, contains a volcanic area about 20-mi wide and extending 100 mi from the island's center to the sea. A 7500-ft volcano is in active eruption and there are many natural steam outlets throughout the area.

Some produce superheated steam, although most flow a combination of steam and water. This is made use of by the native Mauri for cooking, heating, laundering, and bathing, but mainly serves no purpose except as a tourist attraction.

Two Ideal Type T-12 rigs, manufactured by The National Supply Co., have been purchased by the government to reach greater depths than shallow wells that have so far been drilled in the geothermal study. They are rated at 120 input hp and come complete with drawworks, GM diesel engine with torque control, mud pump, and a 96-ft folding mast. Each is carried on a semi-trailer to be set up quickly at the drilling site.

After wells are drilled, test equipment is placed for temperature studies, pressure and flow volume characteristics and variations, steam and water separation, corrosive reactions, and other factors related to steam utilization in a generating plant. A small pilot plant will be built when tests are complete, with the objective of placing a 50,000-kw plant in operation by 1959.

Alco Buys Pipe Company

American Locomotive Co. has made known the acquisition of the business, plant, machinery, equipment, and inventories of the Central Pipe Fabricating & Supply Co. from its joint owners—the H. K. Ferguson Co. and the Associated Piping & Engineering Co.

Alco, the company states, will now be in a position to offer a full line of prefabricated pipe to its present customers. Its plants in Dunkirk, N. Y. and Beaumont, Texas now produce heat exchangers, pressure vessels, water pipe, flanges, and allied equipment.

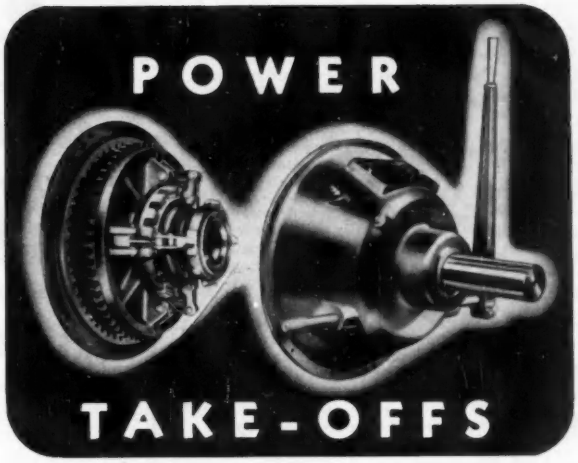
The new property consists of two buildings near Cincinnati. The plant has a present capacity of approximately 200 tons of prefabricated process and power piping a month, ranging in sizes from 2½ in up to 24 in. Facilities are being improved and expanded and manufacturing space increased.

Virginia Rail Orders Diesels

Eighteen additional diesel-electric locomotives have been ordered from Fairbanks, Morse & Co. by the Virginia Railway Co. The locomotives will be manufactured at the Beloit, Wis. works of the company.

When delivered, a total of 43 F-M diesel locomotives will be contained in the Virginia property. The latest order calls for 1600-hp units which will be used for the dieselization of the railroad's east end, from Roanoke to Hampton Roads.

ROCKFORD



FOR GASOLINE AND DIESEL ENGINE APPLICATION

SELF CONTAINED UNIT*
WIDE RANGE OF SIZES
CONSERVATIVE RATING
ROLLER BEARINGS
FINE ADJUSTMENT
ACCURATE BALANCE
S.A.E. DIMENSIONS

* The housing supports the drive shaft, which is mounted on a main bearing in the housing and a pilot bearing in the engine flywheel. The heavy-duty clutch is mounted on the drive shaft, which is extended to serve as the output shaft for the external drive, and may carry a pulley, gear, sprocket, or drive through a coupling.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

BW

ROCKFORD CLUTCH DIVISION BORG-WARNER
▲ 1301 18th. Avenue, Rockford, Illinois, U.S.A. ▲

CLUTCHES

The SIMPLER THE FILTER THE LOWER THE COST

Specify Bendix-Skinner RIBBON FILTER ELEMENTS . . .

- LOWER ORIGINAL COST
- SIMPLE, INEXPENSIVE TO INSTALL
- NO EXPENSIVE BACK UP SUPPORT REQUIRED
- PERMANENT TYPE
- HIGH FLOW RATE (EITHER DIRECTION)
- EASILY CLEANED

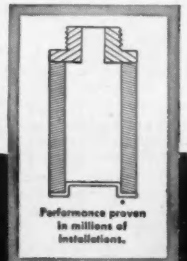
PHENOLIC-RESIN IMPREGNATED CELLULOSE

It seems hard to believe, but you can actually have more efficient filtration at considerably lower cost if you simply use Bendix-Skinner ribbon elements instead of expensive and less adaptable metal edge or metal screen types.

Here's how it works— Bendix-Skinner ribbon elements are inexpensive to begin with and can be installed at far less cost than metallic elements that require special back-up supports. In fact, in practically every instance present metallic-type elements can be changed over to ribbon-type with substantial savings.

Ribbon units are available in diameters from ½" to 6" in any required length with filtration rated at 40 microns (.0016").

Our engineering department will be glad to advise on new installations or to furnish replacement units in a variety of sizes. Write us for details.



Performance proven in millions of installations.

Bendix-Skinner

ORIGINATOR OF **MICRONIC** FILTRATION

BENDIX-SKINNER DIVISION OF Bendix AVIATION CORPORATION

P.O. BOX 135, ROYAL OAK, MICHIGAN

Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N. Y.

CRANKSHAFTS Rebuilt - Hard chrome surfaced

CAMSHAFTS Reground

Connecting rods rebuilt

Hard Chrome deposited on crankshafts by "Rotary Process" adds new shaft life. Shafts electro heat treated 3 times.
Camshaft lobes reground to original lift.
All parts carefully magnafluxed to detect hidden defects.
Experienced Workmen — Specially Designed Machinery — Careful Inspection, guarantee each job.

Crankshaft Capacity
10" Stroke
24" Swing
96" Length

Camshaft Capacity
100" Length

Write for Information and Prices.

AUTOMOTIVE ENGINE REBUILDERS ASSOCIATION

CLEVELAND HONE & MFG. CO.

8816 HARKNESS RD., CLEVELAND 6, OHIO

Serving the Nation's Largest Fleets

Special Notice

Readers changing address for DIESEL POWER should use this form:

OLD ADDRESS

Company .....

Box or Street No. .....

P. O. ..... Zone .....

State .....

NEW ADDRESS

Name .....

Company .....

Box or Street No. .....

P. O. ..... Zone .....

State .....

Please print name and address and give P. O. ZONE number.

news of our industry

Navy Orders Worthington Unit

Worthington Corp. announces that it is building a 2500-kw diesel generating unit for the U.S. Navy's Jim Creek radio-transmitter station at Arlington, Wash. It is claimed to be the largest single unit for this class of service.

While not the largest diesel Worthington has built, it will be the company's latest type, an SW-14 Vee, 16-cylinder of 3600 hp, and include high-pressure turbocharging. Electric Machinery Mfg. Co. is manufacturing the generator, General Electric Co. the switchgear.

The contract is the company's latest for radio transmission service in the government's various branches. In 1941, five diesels were supplied for Navy radio stations. In 1949, 19 were furnished for four Alaskan Air Force fields. More recently, 25 were placed in service for the State Dept.'s Voice of America stations overseas.

Alco Opens Parts Warehouse

A new diesel locomotive renewal parts warehouse utilizing modern warehousing techniques and latest materials handling equipment has been opened by American Locomotive Co. in Chicago. The building will service more than 45 railroads in the central region of the United States, which operates more than 1000 of the company's diesels.

Built of structural steel and covered with insulated aluminum siding, the center measures 120-ft wide by 240-ft long and is made up of 30- by 40-ft storage bays. Approximately 5000 locomotive parts will be stocked. The warehouse has 14-ft ceiling under-clearances and is equipped with racks and bins to handle palletized stock and packaged small items. A railroad loading area served by the Gulf, Mobile and Ohio Railroad runs along one side of the building, and a truck dock with adjustable loading ramps is contained inside the warehouse.

Materials handling equipment includes three specially designed electric-powered lift trucks, a device for spotting railroad cars at any of three rail dock doors, magnesium dock boards, and mobile dollies for handling heavy and bulky items. Provision is made for future addition to the storage area and for establishment of a diesel engine and locomotive component rebuild and repair shop in the present warehouse space.

Railroad Progress

Last year, for the first time in more than a century, the number of steam locomotives on American rails dropped below 10,000. Of those remaining, 30% were in serviceable storage as of August. Only one Class I railroad still operated exclusively with steam motive power and several roads joined the ranks of the 100% dieselized. A new world speed record was set by an electric locomotive hauling a 3-car test train in France. It operated at a sustained speed of 150.9 mph.

These were among railroad developments presented at the annual meeting of the American Soc. of Mechanical Engineers by T. F. Perkinson, General Electric Co.

In the field of electrification, he noted that wires and third rails are giving way to the diesel's advance. Two short mainline electrifications were abandoned last year. Many new rail-trailers or piggy-back services were instituted.

As for atomic-powered locomotives, engineers are still faced with some big problems before they become practical. Danger of radiation effects, difficulty of practical shielding, area contamination, and jeopardy to public health in event of a wreck, are among those still to be worked out.

School Gets Early Diesel Paper

The Franklin Institute has been presented with an original manuscript from the estate of Rudolf Diesel. Dr. Eugen Diesel, son of the inventor, was present at the ceremonies.

The manuscript is in Rudolf Diesel's handwriting and outlines his early ideas in the application of the diesel engine to railroad locomotives. He was awarded the Cresson Medal of the institute in 1901.

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new products

Leak-Proof Socket Screw

Safety Socket Screw Co., 6501 Avondale Ave., Chicago 31, Ill., has developed a socket head cap screw said to withstand loosening and leaking under the most severe operating conditions. Design includes a tapered chamfer shoulder beneath which a ½-in lead washer is pre-assembled.

The washer locks and seals the head of the screw by forming an alloy wedge as the screw is tightened into place, making a permanent lock and seal between the side of the head and the counterbore. It is stated that the screw can be removed and then restored to its original position without losing its effectiveness. Costwise, it is estimated the "Led-Lok" will average about 10% more in price than conventional styles.

Tapping Attachment

A new tapping attachment, the 300, has been announced by Tapmatic Corp., 845 W. 16 St., Costa Mesa, Cal., which is designed to eliminate the human variable "lead error" obtained with conventional attachments.

No spindle pressure is said to be required by the machine operator during the tapping operation, an axial floating action assures uniform tapped holes. Dimensions and forms of the thread produced are dependent solely upon the tap itself. This reduction of axial stress is said to increase the tap's life as much as 400%. The attachment has a 1¾-in maximum diam and a 3¾-in overall length. It contains a mechanism to permit instantaneous reversal of the tap at any time.

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new products

Reusable Hydraulic Couplings

High-pressure hydraulic couplings, reusable and requiring no special tools for hose assemblies, are being offered by Condamatic Co., Inc., 332 W. 21 St., New York, N.Y. They are available in a standard size range for both one and two wire-braided rubber-covered hoses, with both fixed and swivel male end. A line of adapters and fittings for all standard installations is also available.

High-Capacity Electric Hoist

To handle heavy lifts, R. G. LeTourneau, Inc., Longview, Texas is manufacturing a series of 8- and 10-ton capacity electric hoists. Initial series of from 4- to 6-ton capacities were announced by the company in June.

Headroom of the new hoists is approximately 37 in. Lift height is 15 ft and up. Choice of four mountings is offered: plain trolley, hand-geared trolley, motor-driven trolley, and lug mounting. A mechanical load brake for precision control of loads is constructed integral with the hoist motor and gear reduction and automatically engages two cone-shaped metal friction surfaces when 3-phase electric power is broken in the circuit.

Nylon-Lined Bearing

Nylacore Corp., 305 E. Shore Rd., Great Neck, N. Y., has placed on the market a new nylon-lined sleeve-type bearing which is composed of a metal shell into which a thin lining or core of nylon about .005-in thick is molded and anchored to the outer shell.

Very high precision is claimed for the bearing, with tolerances held as closely as plus or minus .002 in for bore, length, OD, and concentricity. The thin lining is said to allow rapid heat dissipation and to resist plastic deformation. The bearings are made in plain sleeve, with thrust collar, or with dust protector and oil seal. Sizes start from 1/32-in diam bore and are made to order only.

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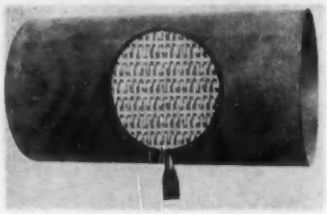

High Temperature Cooling Metal

Aircraft Porous Media, Inc., 20 Sea Cliff Ave., Glen Cove, N. Y., has developed a new porous medium, called Rigimesh, for use in transpiration cooling. It is made by welding together the warp and woof strands of one or more layers of woven wire cloth which is then mechanically treated to produce a homogeneous plate having much finer openings and the uniformity of the starting material.

It is claimed that flow capacity for coolants may be varied from as much as 15 fps (900 cfm/sq ft) at 1 psi differential pressure to as low as 0.2 fps at 1 psi, with excellent uniformity in flow. Methods are also available for varying flow capacity from point to point in a controlled manner. Materials of construction include alloys which can be drawn in the form of wire.

Strengths are said to generally exceed equivalent materials for equal flow capacity and the materials are claimed to retain a higher proportion of their room temperature mechanical properties at elevated temperatures than porous metals fabricated from powders. The metal can be worked in the same manner as solid metal and most grades are said to be ductile enough to be formed back on themselves in a sharp 180-deg bend.

Powdered Rust Remover

Non-toxic, non-obnoxious, non-flammable is the description By-Buk Co., 4314 W. Pico Blvd., Los Angeles 19, Cal., applies to its latest product, a rust remover shipped in powder form. Water is added at the time of use so that the resulting liquid can be controlled to meet requirements for ferrous or non-ferrous metals. No neutralizer is needed.

Derusted surfaces are left with a thin rust-resistant coat. Objects which can be submerged require 10 min to 3 hr at room temperature, depending on amount of rust to be removed. When placed in a hot bath, action is completed in 2 sec to 10 min. For those objects which cannot be submerged in a liquid bath, a thickening agent is added to the liquid solution to make a syrupy substance which can adhere to such surfaces.

Semi-Standard Heat Exchangers

Production has been set up at Downington Iron Works, Inc., Downington, Pa., to provide shipment of a new line of semi-standard heat exchanger units within two to three weeks. There are some optional design features available to specification. The nozzles, for example, may be of any size or in any location and units may be specified with or without an expansion joint. The units are in stainless or carbon steel, other alloys require a longer time for delivery.

Automatic Reading Tank Gauge

To show the height of any liquid, including liquefied gases that are stored under pressure, Liquidvision Gauge & Control Corp., P. O. Box 51, Oceanside, N. Y., has developed a tank gauge known as Magnalux. It is externally connected and can be used on existing tanks without necessity for cutting openings in the tank.

The instrument consists of a non-magnetic column containing a free float, which is connected to the liquid and vapor space of the tank. As tank level changes, the liquid flows through a connecting tube to the column. The float, which has a magnet connected to it, follows this change and the magnetic field positions an indicating roller on the outside of the column to indicate the amount of liquid contained in the tank. The gauge is self-actuated and does not depend on outside power sources for operation. It can be furnished with switches to actuate alarms or to control pumps or valves.

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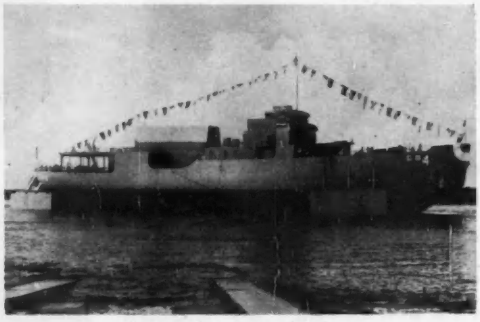

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new literature

Sub-Plate Hydraulic Valves

Its new line of sub-plate mounted, solenoid-operated hydraulic valves is described in Catalog No. 260 published by Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass. Diagrams show flow operation under all types of action for each of the 14 piston designs in which the new valves are offered. Data necessary for individual circuit requirements are also included.

Railroad Pipe Fittings

"Socket-Welding Forged Steel Pipe Fittings for the Railroad Industry" is the title of a new bulletin published by the Watson-Stillman Fittings Div., H. K. Porter Co., Inc., P. O. Box 95, Roselle, N. J.

Complete product descriptions and engineering data are contained on the company's line, including 1-piece air brake flanges, swivel-joint air brake flanges, and ring-joint unions for use in locomotive and car heating steam lines.

Fact File and Sample CaPlugs

To fully present its expanded line of CaPlugs (polyethylene closures), Protective Closure Co., Inc., 2207 Elmwood Ave., Buffalo 23, N. Y., is distributing an illustrated file folder and a representative assortment of samples.

The CaPlug line consists of caps and plugs for protection and sealing of threads, tubing, and fittings. They are said to be impervious to most chemical reagents and to retain form stability under stress and at temperatures from —94°F up to 220°F. The file folder is tabbed and punched for easy filing and encloses complete price lists for over 100 stocked sizes of the five standardized designs.

Automotive Parts Catalog

A 148-page catalog of automotive parts and accessories has been published by J. C. Whitney & Co., 1913 Archer Ave., Chicago 16, Ill. Over 50,000 items are said to be contained and prices quoted are claimed to constitute savings up to 50%. It sells for 25¢ per copy.

Engine Power Costs Report

The "1954 Report on Oil and Gas Engine Power Costs (Data for 1953 and Previous Years)," latest compilation of the American Society of Mechanical Engineers, 29 W. 39 St., New York 18, N. Y., has just been published.

A yearly analysis of the society, this edition contains operating cost data from 113 plants, including 32 which have a total of 96 dual-fuel engines and four plants with a total of 23 gas engines. In all 488 engines are reported, giving 584,880 rated bhp, the net output amounting to 961,924,001 kw hr.

Fuel and lubricating oil economies are graphically illustrated for the following engines: 4-cycle air injection oil-diesel; 4-cycle mechanical injection oil-diesel and dual-fuel; 2-cycle air injection oil-diesel; 2-cycle mechanical injection separate-scavenging oil-diesel and dual-fuel; 2-cycle mechanical-injection crankcase-scavenging oil-diesel and dual-fuel; and spark-ignition gas engines.

The 50-page report sells for $2.50 with a discount for quantity order.

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Relief passage for venting of indicator is opened and closed automatically when turning handwheel.

Valve never needs to be removed from engine for replacement of any parts.

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WRITE FOR BULLETIN 654D

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new literature

Railroad Car Spotter

Book 2092, "Car Spotters and Drum-type Pullers", has been reissued by Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., to describe machinery designed to make railroad car spotting an easier operation. With the aid of these devices, one man is said to be capable of spotting six loaded railroad cars at one time or to handle tasks involving horizontal haulage.

They consist of a vertical capstan, helical and worm gear drive, housing, and integral motor. By wrapping two or three turns of rope around the capstan 10,000-lb starting rope pull is available with the 10-hp model, more with larger models. Engineering information, instructions for calculating rope pulls, and typical layouts for both car spotters and car pullers are given.

Excavator-Crane Movie

"Design for Excavating", showing excavation and crane work with its Hystaways mounted on Caterpillar-built tractors, is a new 12-min color film available from Hyster Co., 2902 N.E. Clackamas St., Portland 8, Ore. It was filmed at job sites to demonstrate maneuverability and mobility of the unit and its quick convertibility into a shovel, backhoe, dragline, clamshell, crane, pile driver, and bulldozer.

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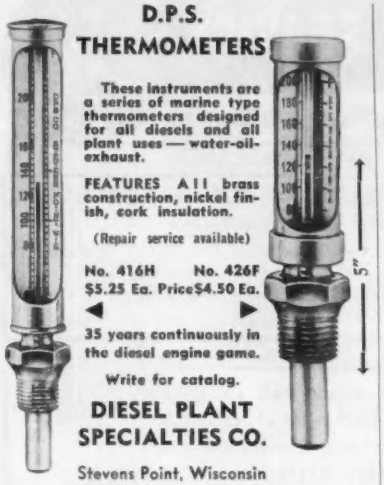

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organizational news

Alco Information Director

Dana T. Hughes has been advanced to the post of director of information of the American Locomotive Co. He has been acting head of the company's news bureau since 1953.

Mr. Hughes first became associated with Alco in 1952 as a member of the public relations department. He was previously with the Dixie Cup Co.

Canada Branch for Borg-Warner

Formation of a new manufacturing subsidiary, Morse Chain of Canada, Ltd., has been announced by Borg-Warner Corp. The new company will occupy a plant to be built at Simcoe, Ont., and will produce automotive and industrial chain for the Canadian market. It is expected to be in operation by February.

The plant will be under the direction of S. J. Roush, president of Morse Chain Co., an American subsidiary of Borg-Warner. Another plant, to be operated by Long Mfg. Ltd., another subsidiary, is under construction at Oakville, Ont. Automotive radiators will be produced there.

Earthmoving Consolidation

LeTourneau-Westinghouse Co., subsidiary of Westinghouse Air Brake Co., has entered into an agreement to purchase the plant and assets of J. D. Adams Mfg. Co., manufacturer of roadbuilding and earthmoving equipment. The transaction will increase the number of plants operated by L-W to six.

Howard R. Meeker, president of Adams, will be chairman of the board of L-W. Floyd D. Wallace, vice president, will become a vice president and director of the parent company and will be general manager in charge of manufacturing operations at Indianapolis.

Federal-Mogul Assignments

Two relocations have been announced in the sales organization of

G. Gardner

R. Manguse

Federal-Mogul Corp. R. B. Manguse has become Wichita district manager and George Gardner, Portland district manager.

Mr. Gardner has been Wichita district manager for the last three years. He has served the corporation since 1926, including several years in a supervisory capacity at its Detroit manufacturing plant. He transferred to the service division in 1949 as special markets manager at Detroit.

Mr. Manguse has been with the company since 1947 after previous accounting experience in automotive and allied businesses. His previous company assignments have included both supervisory and sales work; his latest position was that of Dallas district salesman.

MARCH OF DIMES

FIGHT INFANTILE PARALYSIS

JANUARY 3-31

organizational news

National Supply Sales Changes

C. Clark Kenlan, who has been associated with the industrial generator set and electrical equipment business, has been appointed a special representative of the Engine Div. of The National Supply Co. with headquarters in Springfield, Ohio. He will be responsible for coordination and development of small engine sales.

Two sales engineers in the division have been assigned to new territories. D. C. Vick, who formerly made his headquarters at Springfield, has been transferred to Lincoln, Neb. to assist J. A. Dye. He will cover Nebraska, Kansas, and parts of other midwestern states. R. A. McCloskey, who worked with Mr. Vick, will continue at Springfield and will cover Ohio, Kentucky, West Virginia, and the southern part of Indiana. R. B. Richardson Co., National Supply's engine distributor, will take charge of the Michigan territory.

Worthington Changes

The board of directors of Worthington Corp. has announced several changes in company management.

Hobart C. Ramsey is the new chairman of the board, succeeding Howard Bruce who is now chairman of the executive committee. Mr. Ramsey will continue as chief executive officer with Edwin J. Schwanhausser succeeding him as president of the corporation.

Walther H. Feldmann is the new executive vice president, succeeding Mr. Schwanhausser. Thomas J. Kehane will take on Mr. Feldmann's former position as vice president in charge of sales.

Mr. Ramsey, a member of Worthington since 1920, has held executive positions in sales, engineering, and manufacturing. He became president in 1949. Mr. Schwanhausser joined Worthington in 1915, was elected to the board of directors in 1942, and has been executive vice president since 1949.

Mr. Feldmann began with Electric Machinery Mfg. Co. in 1922,

E. Schwanhausser

H. Ramsey

T. Kehane

W. Feldmann

rose to vice president and general manager in 1940, and president in 1944 when it became a subsidiary of Worthington. He was named vice president in charge of sales of Worthington in 1950. Mr. Kehane has been with the corporation since 1915. His last position was assistant vice president and general sales manager.

Hercules Appointments

John G. Ketterer has been elected to fill a vacancy in the board of directors of Hercules Motors Corp. At the same time it was revealed that Frank J. Malone has been named general works manager.

Mr. Ketterer, member of the law firm of Day, Cope, Ketterer, Raley and Wright, has been serving as general counsel for the company. Mr. Malone, a 20-year member of the organization, has been serving as works engineer. He was formerly associated with Ingersoll Milling Machine Co.

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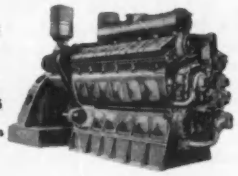

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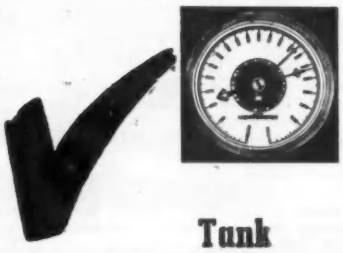

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GM DIESEL
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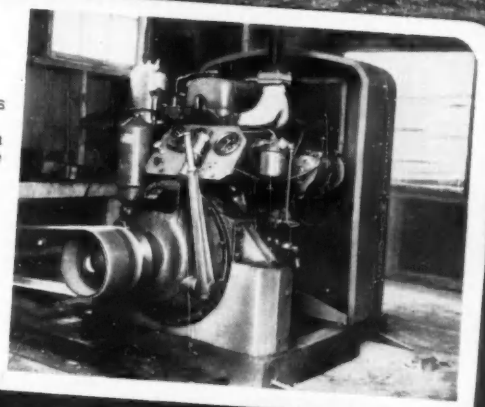
USER: Iron Ore Company of Canada

INSTALLATION: GM 3-71 powers Jackson Lumber Harvester 50" saw; 2-71 (illustrated) drives Newman 8-B planer (one of 10 GM Diesel-powered mills on I.O.C. project). Mill shown is turning out lumber for permanent townsite at Knob Lake, 360 miles above base camp at Seven Islands, Que.

PERFORMANCE: "Never stalls on spruce knots," says the operator. GM 3-71 on this sawmill has run 6,000 hours without overhaul. Produces 12,000 ft. of lumber per day on 20 gallons of fuel. Mill moved and completely set up in two days. Two-cylinder unit on planer and blower "has power to spare"—handles 3" to 3½" planks up to 12" wide.



—and here's why they're preferred on sawmills and planers

Pushing a railroad 360 miles through wilderness to the remote Quebec-Labrador border, the Iron Ore Company of Canada relies on General Motors Diesel engines to power sawmills and planers supplying lumber for camps and facilities—plus a wide variety of other jobs.

In lumbering—as in all heavy-duty tasks—the compact GM engine is the world's most widely used Diesel, because its quick-accelerating 2-cycle operation gets work done faster at lower cost.

In isolated operations like this—where fuel and all other supplies had to be flown in—lighter weight and interchangeability of GM Diesel parts insures higher availability and lower cost maintenance. One basic stock of parts serves all Series 71 engines—2 to 24 cylinders—so inventory requirements are lower. And GM Diesel's world-wide distributor organization assures quick and competent service when you need it. See your nearest GM Diesel distributor or write us for further information.

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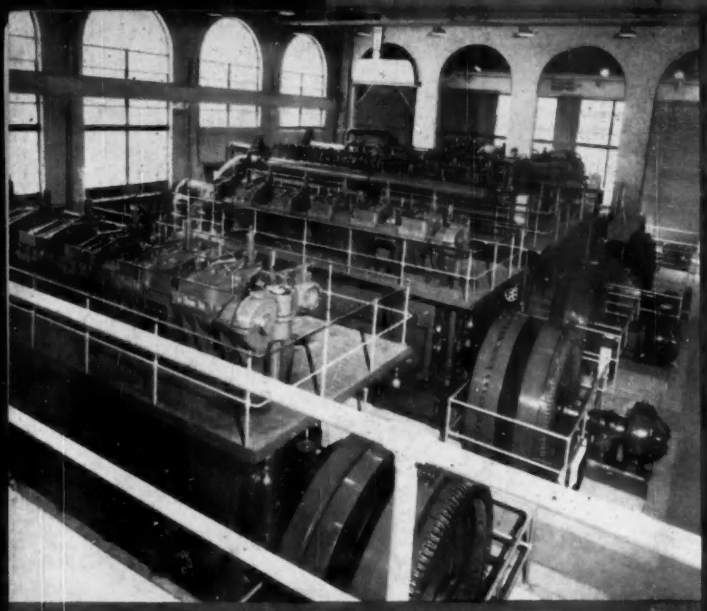

Maintenance of plant buildings and equipment make this light plant a showplace station of which Pierre residents are justly proud.

What Happens When STANDARD HD OIL Is Called In on a Ring Sticking Problem

In 1946, after experiencing considerable trouble with ring sticking, Pierre, S. D., Municipal Light Plant management decided to test STANDARD HD oil in their 2,000 hp. diesel engine. Result: nine years later and after 31,840 hours of operation the original fill of STANDARD HD oil is still in the diesel.

Plant Superintendent Floyd Halbert says engine cleanliness is what he values most. "Cleanliness of the oil is outstanding," he reports and says further, "There is almost no carbon, a minimum of cylinder wall wear and complete freedom from ring sticking. There has never been a bearing failure. Maintenance time for lubrication is zero."

A typical record for STANDARD HD oil? Yes. STANDARD HD is helping many other plants establish new performance records, while setting new levels of engine cleanliness for old engines, and keeping new engines clean from the date of initial fill. Result: more and more folks with industrial lubrication problems like the one at Pierre, call for assistance from their Standard Oil lubrication specialist.

Perhaps you would like to find out more about STANDARD HD. In the midwest, call your nearby Standard Oil lubrication specialist. Or contact, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)

STANDARD

In addition to the 2,000 hp. engine, Pierre plant has a 3,000 hp. and two smaller engines. All are lubricated with STANDARD HD Oil. Floyd Halbert (right), and Standard Lubrication Specialist Bob Kirk, go over Pierre plant operation sheet. Bob Kirk is an old hand at helping people solve lubrication problems. He's been doing this for Standard since 1943. Bob got his engineering training from the University of Washington. He has also completed the Standard Oil Sales Engineering School. Customers find this experience and training pay off for them.